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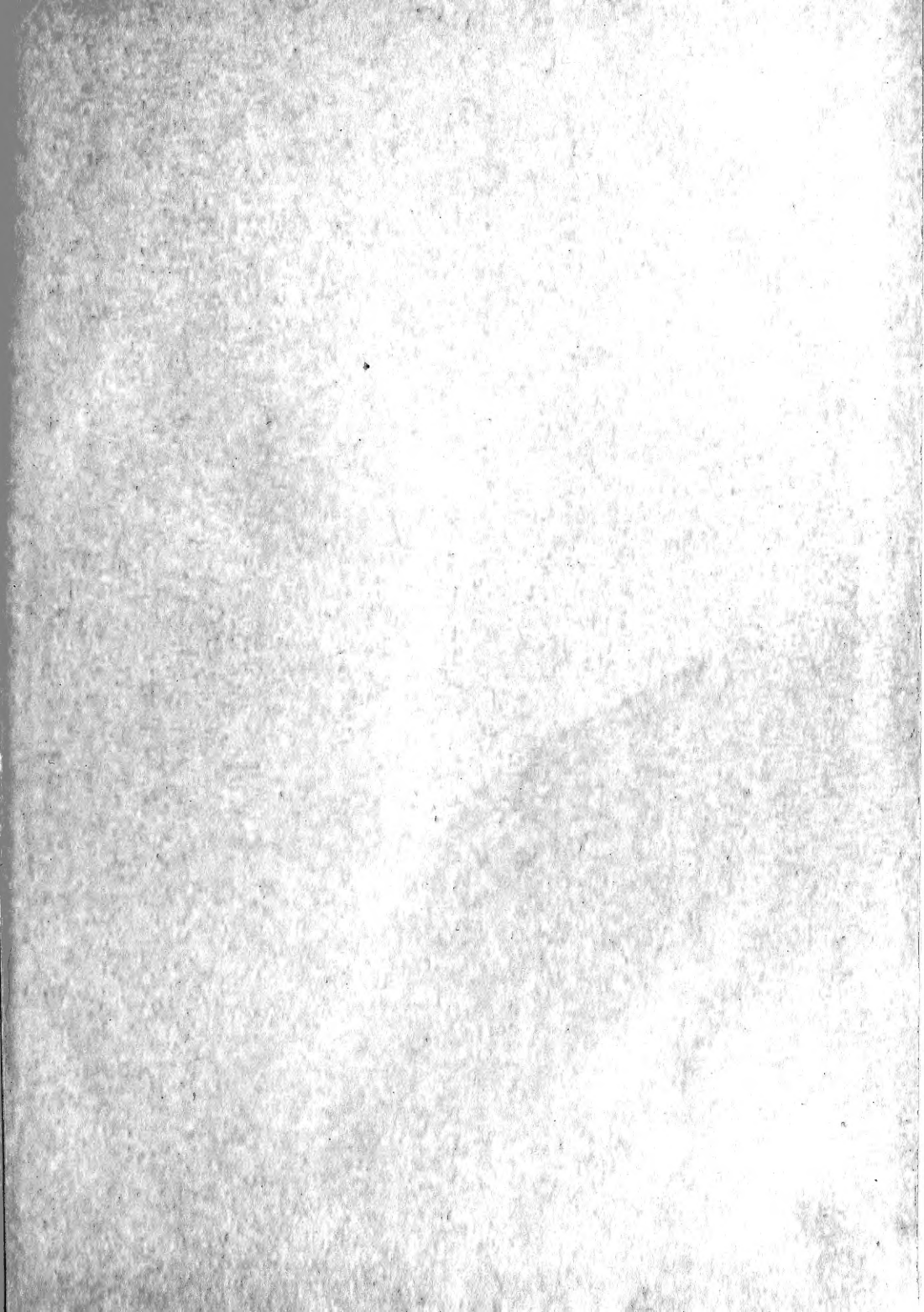
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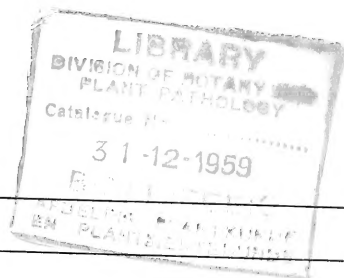
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THE PHYTOGEOGRAPHY OF MEMBERS
OF PROTEACEAE IN AFRICA.

by
MARGARET R. LEVYNS.

INTRODUCTION.

South Africa occupies a unique position among the land masses of the southern hemisphere, for although some of its floras are as distinctively austral as are those of South America and Australasia, yet clues to past migrations into Africa from any lands in the south are lacking. In both the other southern continents there is evidence to show that even if elements of their floras did not originate in Antarctica, yet there must have been some transantarctic connection to show the close relationships that exist between certain components of their floras. Goodspeed in his comprehensive study of *Nicotiana*⁴ has shown this clearly and the distribution of other genera such as *Nothofagus*, *Hebe*, *Lomatia*, *Araucaria* etc. are best explained by some connection in the past between South America, Antarctica and Australasia. If South Africa received part of its present floras from the south, we might expect to find traces on islands such as Kerguelen, Marion and Heard. This is not the case for the floras of these islands show a definite affinity with that of South America although geographically they are much closer to Africa.

The problems of plant distribution in the southern hemisphere have long attracted attention. J. D. Hooker was a pioneer in this field⁵ and his discussions may still be read with profit. He clearly favoured the hypothesis of a southern origin though he was careful to state that there was no conclusive evidence available in support of it. Many others have followed his lead, among them the late Field Marshal Smuts¹¹, and to-day there are still many adherents of the so-called antarctic hypothesis. The

family Proteaceae looms large in any discussion on southern origins for the bulk of its members occur south of the equator. As recently as 1953 Good, referring to this family, states that they show "almost indisputable evidence of a southern origin"³. The African Proteaceae show a clear though rather remote affinity with those of Australia and this has often been used in arguments in favour of a common southern origin for both floras.

The object of the present paper is to record some facts of distribution of the family in Africa and to draw such conclusions as are legitimate.

AFRICAN MEMBERS OF PROTEACEAE AND THEIR DISTRIBUTION.

Proteaceae is divided into two subfamilies, Persoonioideae and Grevilleoideae. In South America all genera belong to Grevilleoideae. In Australia both subfamilies are represented. Hitherto all the South African genera have been placed in Persoonioideae but it will be shown later in this paper that one of them, *Brabeium*, has considerable claims to be regarded as a member of Grevilleoideae.

Fourteen genera occur in Africa. Two of them, *Protea* and *Faurea*, have a wide distribution, some of them extending north of the equator. A third, *Leucospermum*, has a much more restricted geographical range, but it too extends beyond the area of the Cape Flora. The remaining eleven genera are massed in the south western corner of Africa and are confined to the area characterised by the Cape flora.

With the exception of *Faurea* the distribution pattern of the genera within the Cape region is in no way different from that of other members of this most interesting flora. The significance of the distribution of species within the Cape area has been dealt with in recent papers (^{5,6,7}). All that is necessary here is to draw attention to certain salient facts. The mountain ranges in the southern tip of Africa run roughly parallel to the coast line. In the region now occupied by the Cape flora they were in existence by the end of the Triassic and since then their vegetation has suffered no major catastrophe. This holds true for the mountains only, for on the seaward side there have been marine invasions, while inland, evidence of arid periods is clearly indicated. Thus the only place where old types of vegetation will have found refuge is on the mountain ranges. Thus for our present purpose studies of distribution on the mountains are likely to produce results lacking elsewhere. Up to the present South Africa has not been divided into small phytogeographical units suitable for plotting the distribution of species. Use therefore has to be made of the established magisterial divisions, those for the south western Cape Province being shown in Fig. 1. The shaded divisions are those in which

the main mountain ranges occur and they are used in the tables which follow. In three cases where divisions are rather small, two have been united. In the west the rain falls mostly during the winter but the divisions from Swellendam eastwards show a gradual transition from winter to summer rainfall. Riversdale, the most easterly division selected, has its rainfall distributed fairly evenly throughout the year. The highest rainfall is in the Paarl, Stellenbosch and Caledon divisions.



FIG. 1.—Map of the south western Cape Province showing the divisional boundaries. The shaded divisions are those in which the main mountain ranges occur.

TABLE 1.—DISTRIBUTION OF SPECIES IN THREE OF THE CHARACTERISTIC FAMILIES OF THE CAPE FLORA.

	<i>Restionaceae</i>	<i>Bruniaceae</i>	<i>Proteaceae</i>
Clanwilliam	44	14	68
Ceres	57	15	80
Worcester and Tulbagh	81	20	84
Paarl and Stellenbosch	83	23	97
Caledon	103	42	135
Swellendam	22	10	48
Heidelberg and Riversdale	57	9	40

In table 1 the number of species occurring in the shaded divisions is shown for three typical Cape families. All three show the same distributional pattern viz. a concentration of species in the Caledon Division in the south western corner and a diminution both northwards and eastwards. Table 2 provides the same information for five of the larger genera in the Cape flora. The same features are evident, though in the case of *Agathosma* the region of highest concentration has shifted northwards. Table 3 shows similar figures for the eight Cape species of *Proteaceae* containing 12 or more species. The information given here is

TABLE 2.—DISTRIBUTION OF SPECIES IN FIVE CHARACTERISTIC CAPE GENERA.

	<i>Erica</i>	<i>Cliffortia</i>	<i>Phyllica</i>	<i>Muraltia</i>	<i>Agathosma</i>
Clanwilliam	74	10	29	12	39
Ceres	88	12	22	14	27
Worcester and Tulbagh ..	119	22	22	17	24
Paarl and Stellenbosch ..	144	33	18	27	16
Caledon	238	40	35	34	22
Swellendam	86	18	11	19	16
Heidelberg and Riversdale	74	15	17	16	18

TABLE 3.—DISTRIBUTION OF SPECIES IN EIGHT GENERA OF *PROTEACEAE*.

	<i>Protea</i>	<i>Leucospermum</i>	<i>Leuca-dendron</i>	<i>Serruria</i>	<i>Spatalla</i>	<i>Sorocephalus</i>	<i>Paranomus</i>	<i>Mimetes</i>
Clanwilliam	19	10	20	8	2	3	2	0
Ceres	25	7	21	7	4	5	3	1
Worcester and Tulbagh ..	28	9	21	6	3	4	6	1
Paarl and Stellenbosch ..	27	9	21	13	8	3	3	5
Caledon	39	17	29	12	11	5	3	10
Swellendam	16	5	13	2	3	2	2	3
Heidelberg and Riversdale ..	14	6	9	1	3	0	2	2

based on records given in the *Flora Capensis*, supplemented by subsequent records in the Bolus Herbarium and in the herbarium of the department of Botany in the University of Cape Town. The information is incomplete for it has become clear that much more work on this family is needed, but it is sufficiently accurate to demonstrate that *Proteaceous* genera show a distributional pattern similar in all respects to those of other components of the Cape flora.

Leucospermum has the most restricted range of the three genera extending outside the Cape area. One species occurs on mountains in Namaqualand but there have been no records of any species in either South West Africa or Angola. In the east the genus extends further to the north but has not been recorded beyond Rhodesia and Mozambique. The two remaining genera have a much wider distribution and will be considered separately.

Protea is the largest genus and has over 90 species in Temperate South Africa. These, as we have seen, show a concentration of species in the south west but species occur outside the Cape area on high ground in the east. In Tropical Africa there are over 50 species. A comparison between the Cape and the non-Cape species brings to light a significant fact. Among the Cape species the three with the widest range extend from the Clanwilliam to the Albany Divisions. These are *P. mellifera*, *P. grandiflora* and *P. cynaroides*. They are liable to be found throughout their range wherever a suitable habitat occurs. In other words they show a continuous type of distribution over a somewhat limited area when we are considering Africa as a whole. The Cape area is shaded in the map given in Fig. 2

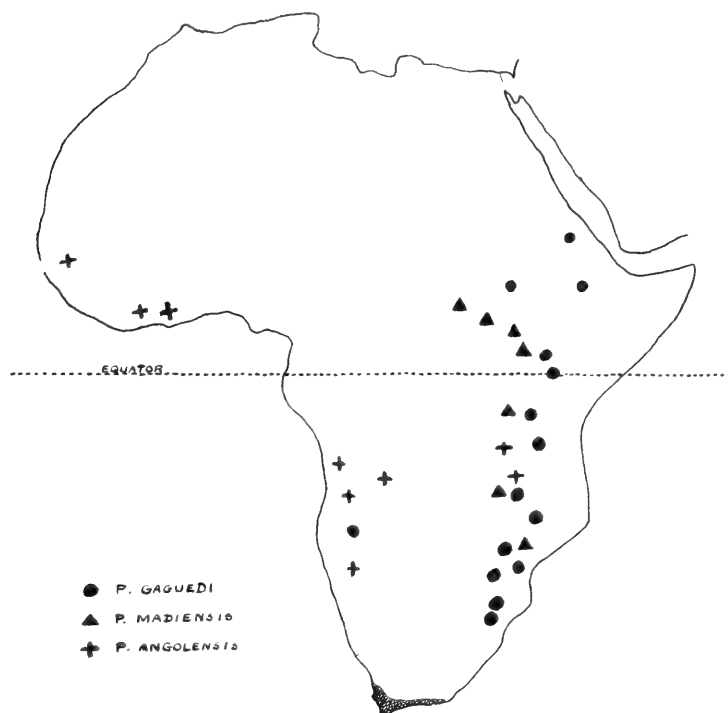


FIG. 2—Outline map of Africa showing the distribution of three species of *Protea*. The area characterised by the Cape flora is shaded.

On the other hand many of the non-Cape species show not only a very wide type of distribution but also marked discontinuities. This is illus-

trated in Fig. 2 where the distribution of three such species is shown. They are *P. gagedi* (syn. *P. abyssinica*), *P. angolensis* and *P. madiensis*. *P. gagedi* has the widest range of all. It is largely an eastern species, occurring on mountains and higher ground from Eritrea north of the equator to the Transvaal in the south. It has also been recorded from Angola. A glance at the map will show how widely separated the localities are from which this species has been recorded. *P. angolensis* shows similar features but its territory is largely western. Its most northerly station is in French Guinea and its most southerly in South West Africa. It has outliers in the east in Tanganyika and Nyasaland. The third example, *P. madiensis*, has a less spectacular range but here too discontinuities are marked.

Discontinuities in distribution such as are found in Central Africa can hardly be explained otherwise than by assuming that the species must at one time have had a more continuous range and that the isolated stations of to-day indicate that such species are relics. In the Cape area there are no marked discontinuities and few of the species extend even a short distance out of the Cape region. On the other hand many species of the south occupy very limited areas and are likely to be youthful endemics. Thus the facts of distribution suggest that the older species of *Protea* are those of Central Africa and that therefore *Protea* does not support the theory of a southern origin.

Faurea is a smaller genus than *Protea* having only seventeen species but in many respects its distribution affords a parallel to that of *Protea*. A species *F. rochetiana* (syn. *Leucospermum rochetianum*) occurs as far north as Abyssinia. The genus has the same widely spread, discontinuous species in Central Africa. Such are *F. saligna* which extends from Uganda and Tropical West Africa in the north to the Transvaal and Natal in the south, and *F. speciosa* with a similar range. However, there are two geographical features which distinguish *Faurea* from other African *Proteaceae*. It is not confined to the mainland but extends to Madagascar where one species occurs. The second feature is that no species of the genus is a member of the Cape flora. The most southerly species, *F. macnaughtoni* occurs at Knysna but it is a forest tree and never enters into the composition of the Cape sclerophyll.

FOSSIL EVIDENCE.

Simpson working on lignites on the west coast of Scotland, made some interesting discoveries which have been recorded in the second edition of Walton's Fossil Plants¹². The older (the Ardnamurchan beds) are presumably of Oligocene age and contain among other pollen grains those of the proteaceous genera, *Faurea*, *Lambertia* and *Petrophila*. The other

series (the Mull beds) are either of late Miocene or Pliocene age. In these proteaceous pollen is again found but in this case *Dryandra* replaces *Faurea*. To-day *Faurea* occurs only in Africa and Madagascar while the other genera are in Australia. This is clear evidence that in Tertiary times Proteaceae occurred in northern Europe. The fact that Proteaceae also occurred in North America at the same time is provided by the work of MacGinitie working on the Florissant Beds of Colorado. He found foliage and fruit of a species of *Lomatia*, *L. lineata*, allied to *L. ferruginea* which grows in South America to-day. At the present time there are three species of *Lomatia* in Chile, two in Tasmania and four in Australia.

THE TAXONOMIC POSITION OF *Brabeium*.

Brabeium, with a single species *B. stellatifolium*, is confined to the Cape region, occurring along streamsides and in other damp but not shaded places. All other African Proteaceae are clearly related to one another but *Brabeium* differs in almost every respect. Hitherto it has been placed in the subfamily Persoonioideae, tribe Persoonieae, but if we do not rely exclusively on the fruit for determining its true affinities, it fits better into the subfamily Grevilleoideae. Mr S. Garside, who for many years has made a special study of the family Proteaceae, has come independently to the same conclusion. The features that distinguish it from the other African genera are its whorled leaves, the deciduous bracts with more than one flower in each axil, the cup-like growth round the base of the ovary in place of separate scales, the free stamens and the ovary with two pendulous ovules. True it lacks the follicular fruit of most of the Grevilleoideae but the Australian genus *Macadamia*, placed in this subfamily, also has an indehiscent fruit. Indeed Bentham and Hooker record in the *Genera Plantarum*¹ that *Macadamia verticillata* is very similar to the Cape *Brabeium stellatifolium*. Whorled leaves are not common in Proteaceae and it is tempting to speculate that the ancestor of both these may have been *Lambertia* which has leaves of this kind. The records of pollen of *Lambertia* in Scotland during the Tertiary period are suggestive. However the mystery still remains of how this aberrant member of Proteaceae in Africa came to be isolated in the extreme south.

It is interesting to note that *Brabeium* has seven as its basic number of chromosomes². This number though recorded for several Australian genera, is unknown among the other African genera where twelve is the most characteristic basic number. A record of chromosome numbers in *Faurea* appears to be lacking and it would be of great interest to obtain chromosome counts in this, apparently the most ancient of our African genera.

CONCLUSIONS.

The fact that the bulk of the Proteaceae in Africa are massed in the south western corner, has long been known. It has been shown in this paper that their distribution within this area follows the typical pattern of any true member of the Cape flora, that is, they are concentrated in the south west and their numbers diminish in an orderly fashion both northwards and eastwards. The author has on previous occasions given reasons for thinking that this phenomenon is due to secondary causes which have operated in relatively recent times.

In considering the distribution of Proteaceae in Africa it is most striking that in the area of greatest concentration there are no marked discontinuities. Further the numbers of closely related species occupying limited and adjacent or overlapping areas is another noteworthy feature. Turning to distribution in Central Africa, there the picture is very different. The widespread species exhibit discontinuities of a most impressive kind. If the family had had a southern origin, then surely the reverse would have been the case!

Proteaceous fossils have long been suspected in Cretaceous and Tertiary rocks but their identifications have been open to doubt. However, we find a scientist as cautious as the late Sir Albert Seward expressing the belief that some of the identifications would prove to be correct¹⁰. Recent work to which reference has been made, makes it certain that Proteaceae were in existence in the Northern Hemisphere in Tertiary times. If we add to this the facts of present-day distribution in Africa, then the hypothesis of a northern origin has much to commend it.

It is well known that since mid-Tertiary times the floras of the Northern Hemisphere have undergone profound changes. An analysis of Simpson's list of angiospermous and gymnospermous pollen grains from the Scottish lignites¹², showing where the same genera are to be found to-day, is of interest in the study of plant migrations.

				<i>Ardnamurchan Beds</i>	<i>Mull Beds</i>
				(19 genera)	(30 genera)
Europe	..	..	..	2	11
America	..	..	..	4	14
Asia	..	..	..	11	23
Africa	..	..	..	3	3
Australasia	..	..	..	7	7

These figures show that the main paths of migration were mainly east and west. However, some genera found their way into Africa and Australia. The barrier to southward migration seems to have been stronger in Africa than Australia but this is hardly surprising. The Tethys Sea must have been a formidable obstacle to movements into Africa and

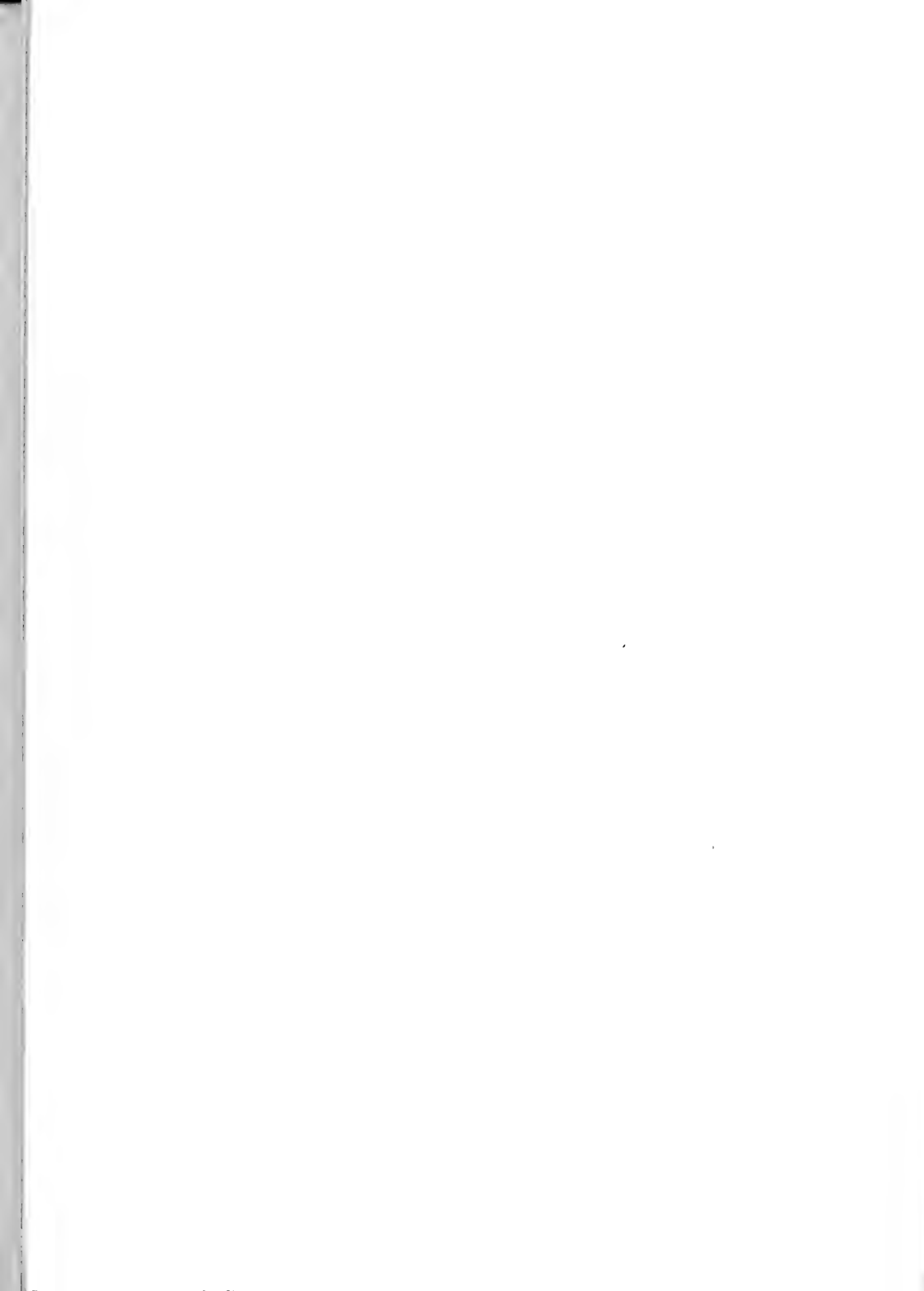
at times desert conditions must have imposed yet another barrier. However it seems clear that there were periods when the routes to the south must have been open and it is likely that at such times the Proteaceae made their way into Africa.

SUMMARY.

The Proteaceae have at times been used to support the southern origin of some austral floras. Thirteen of the fourteen African genera have a high concentration of species in the winter rainfall area. *Protea* has a wide distribution in Tropical Africa with marked discontinuities. *Faurea*, the only non-Cape genus, has a range in Central Africa similar to that of *Protea* but is also found in Madagascar. Palynological evidence indicates that *Faurea* occurred in Scotland in mid-Tertiary times. Marked discontinuities in distribution in Central Africa and the absence of this phenomenon in the south support the northern origin of the family. The problem of *Brabeium* is discussed.

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THE SOUTH AFRICAN SPECIES OF AIZOACEAE.

IV. *Mollugo*, *Pharnaceum*, *Coelanthum*, and *Hypertelis*.

by

R. S. ADAMSON.

These four genera are closely allied, and, in the various schemes of classification of the family or families which have been proposed, have always been associated. Indeed, in the past some authors have treated them as belonging to a single genus (e.g. Spreng. Syst. 1: 948. 1825; Ser. in DC. Prodr. 1: 391. 1824).

All are small plants, herbaceous or somewhat woody, with small simple leaves with membranous stipules. The leaves are in whorls in the inflorescence region, in the vegetative either in whorls or alternate and often crowded. The stipules are much divided in *Pharnaceum* and *Coelanthum* but more or less entire in the others. The inflorescence is a pedunculate cyme, rarely sessile, with pedicillate flowers. The cyme is a simple umbel in *Hypertelis* but in the others di- or polychasial (3—6) with slender branches and pedicels. The ultimate branches are commonly monochasial with the flowers in an apparently racemose arrangement, a 'pseudoraceme.'

The flowers are usually small with a single perianth of 5 segments which are green or brown outside but white or coloured inside and at the edges of the lobes. Except in some species of *Hypertelis* the stamens are isomerous and alternate with the perianth lobes. The ovary is superior, of 3—5 united carpels each with many ovules. The stigmas are free and usually with no style. The fruit is a loculicidal capsule. The many seeds are more or less compressed with a short funicle and no appendage. In all the perianth is persistent round the fruit and may become somewhat enlarged. In this account where measurements of the perianth are given they are taken from flowers as they open.

The genera were revised and given their present connotation by Fenzl Ann. Wien. Mus. 1 & 2. 1836—40. This revision has been closely followed by all subsequent writers. Since Sonder Fl. Cap. 1. 1860. revised the species little attention has been given to them. While some species have been added, no attempt has been made to treat the genera as a whole and considerable confusion in identification in collections has resulted.

Of the four genera *Mollugo* is cosmopolitan in the warmer regions, the others are African. *Pharnaceum*, the largest, is confined to southern Africa. *Coelanthum* is an endemic on the coastal belt on the west coast

of S. Africa. *Hypertelis* extends throughout Africa and has species in Madagascar and in St. Helena.

In the course of this investigation living material has been examined wherever possible. In addition to the author's own collections, material in the following herbaria has been examined:—

British Museum (Nat. Hist.) London	BM
Bolus herbarium, Cape Town	BOL
Botany School, Cambridge	CGE
University of Cape Town	CT
Conservatoire de Botanique, Geneva	G
Albany Museum, Grahamstown	GRA
Royal Bot. Gds., Kew	K
Nat. Bot. Gds., Kirstenbosch	NBG
Dept. of Botany, Oxford	OXF
Nat. Herb., Pretoria	PRE
Nat. Hist. Riksmus., Stockholm	S
South African Mus., Cape Town	SAM
Bot. Gart. & Mus. Univ., Zurich	Z

The specimens in the Linnean herbarium, London have also been consulted. To the curators and staff of these institutions I wish to return thanks for the facilities granted for the examination of specimens and for help in many ways. Thanks are specially returned to the Keeper of Botany, British Museum, for obtaining the loan of specimens from other collections for examination.

KEY TO THE GENERA.

- I. Inflorescence a simple umbel; stipules entire.
 2. Leaves fleshy: stipules large, persistent, adnate to the leaf-base: flowers large *Hyperteiis*
 2. Leaves not fleshy: stipules small, usually caducous, free from the leaf-base: flowers small *Mollugo*
- I. Inflorescence dichasial or compound.
 3. Perianth segments united for at least half their length: stamens attached to the perianth. *Coelanthum*
 3. Perianth segments free or connate at the base only: stamens free from the perianth.
 4. Flowers with a disc below the ovary: stipules usually divided *Pharnaceum*
 4. Flowers with no disc below the ovary
 5. Stipules divided, persistent: flowers white or coloured: stigmas broad, usually revolute: seeds orbicular *Pharnaceum*
 5. Stipules entire, deciduous: flowers greenish: stigmas linear: seeds angular or pear-shaped . . . *Mollugo*

MOLLUGO

L. Sp. Pl. 49. 1753; *emend.* Fenzl Ann. Wien. Mus. 1: 375. 1836.
Galiastrum Heist, ex Fabr. Enum. Pl. Hort. Helm. 108. 1759.
Lampetia Raf. Fl. Tell. 3: 34. 1836.

Herbs usually annual. Leaves basal or in whorls on the stem. Stipules small, often caducous, sometimes wanting. Perianth segments free or almost so, obtuse, not brightly coloured. Stamens 3—5, rarely more. Disc wanting. Stigmas cylindrical or clavate, not revolute. Seeds compressed, triangular or pear-shaped.

The type species is *M. verticillata* L.

Cosmopolitan in the tropics and warmer temperate regions especially in the southern hemisphere. In southern Africa in the warmer more tropical parts and scattered through the drier regions. As emended by Fenzl, the genus forms a natural assemblage, especially when the genus *Glinus* L. which has been merged in it by many authors, is excluded. The plants are annuals which die down in the dry season. They show little specialisation in vegetative features.

KEY TO THE SPECIES.

- | | |
|--|-----------------------|
| 1. Basal leaves evanescent, cauline linear in several whorls: inflorescence terminal and axillary: pedicels longer than the leaves | 1. <i>cerviana</i> |
| 1. Basal leaves persistent, cauline wanting or few and small. | |
| 2. Basal leaves oblong or obovate, spreading on the ground. | |
| 3. Basal leaves obovate, sessile, over 3 cm. long: inflorescence more than 10 cm. high: branches erect, 1-flowered | 2. <i>nudicaulis</i> |
| 3. Basal leaves oblong or obovate, petiolate, less than 1.5 cm. long: inflorescence less than 5 cm. high, with pseudoracemose branches | 3. <i>pusilla</i> |
| 2. Basal leaves narrow lanceolate, usually erect. | |
| 4. Glaucous: basal leaves succulent: inflorescence branches rigid, 2-ranked | 4. <i>namaquensis</i> |
| 4. Green: basal leaves thin: inflorescence branches very slender | 5. <i>tenella</i> |

1. *M. cerviana* (L.) Ser. in DC. Prodr. 1: 392. 1824.

Pharnaceum cerviana L. Sp. Pl. 272. 1753.

P. umbellatum Forsk. Fl. Aeg. Arab. 58. 1775.

M. umbellata Ser. in DC. Prodr. 1: 393. 1824.

M. spathulaefolia Dinter Fedde Rep. 19: 230. 1923.

M. tenuissima A. Peters Fedde Rep. Beih. 40.2: 29. 1938.

A glabrous many-stemmed annual, 5—20 cm. high, the stems pale-coloured, slender, rather rigid. Leaves basal and in whorls of about 6, the whorls 0.7—2.5 cm. apart. Basal leaves short-lived, variable in shape, linear or narrow oblong, 0.5—1.2 cm. long, or broadly obovate or spatu-

late, 0.4—0.6 cm. long, 0.1—0.3 cm. wide, obtuse. Stem leaves linear or linear-oblong, 0.4—1 cm. long, rather rigid, often glaucous. Inflorescences terminal and axillary, usually pedunculate, often with accessory cymes or solitary flowers at the nodes. Cymes with 2—4 flowers. Pedicels slender, straight, rather rigid, 0.5—1.5 cm. long, usually longer than the leaves. Flowers green, rounded. Perianth segments 1—2 mm. long. Stamens 5, less often 3. Stigmas 3, very short. Fruit rounded, as long as the perianth. Seeds brown, compressed, triangular in outline.

The type is in herb. *Linn.* (387:1).

Open places, most commonly on sand. Rather widely scattered through the drier regions.

Green or more commonly glaucous. Variable in size. The basal leaves which wither away at or about flowering time, and are wanting in many specimens, are variable in shape, ranging from linear through linear-oblong to obovate or spatulate. The wider leaves are 1.5—3 mm. across and shorter. Fenzl (l.c.) described two varieties:— *a*) *linearis* with linear basal leaves, and *b*) *spathulaefolia* with obovate or spatulate basal leaves. While the extremes look distinct, and while in general plants with broad basal leaves have wider cauline leaves, there are all grades of intermediate and no sharp line of separation can be drawn between the two varieties. The type specimen is one with linear basal leaves. Plants with the more extreme forms of wider basal leaves have not been recorded in southern Africa. The peduncle of the inflorescence varies from as long as the pedicels to extremely short or even wanting.

S.W. AFRICA. Grootfontein *Schonfelder* S392 (PRE): Okahandja *Bradfield* 71 (PRE): *Engler* 6468 (K): *Zschokke* (Z): Okjimbinque *Leendertz* (Z): Windhoek *Jordan* (BM): Gobabis *Liebenberg* 4256 (PRE): Rehoboth *Fleck* 194, 804 (Z): *Strey* 2034 (PRE): Aus *Schenck* 71 (PRE.Z): Luderitz *Dinter* 15a (Z): *Kinges* 2338 (PRE): Gamus *Pearson* 4491 (K): Tschamoup *Gerstner* 6227, 6359 (PRE): Gt. Fish Riv. *Pearson* 9800 (K): Kl. Karas *Ortendal* 93 (K.PRE): Narudas Sud *Pearson* 8578 (K): Sabiesis *Pearson* 3607 (K): Schackalskuppe *Pearson* 4789 (K): Warmbad *Pearson* 4296 (K): Amboland *Rautanen* 149 (Z): *Schinz* 886 (Z): Hereroland *Dinter* 78 (Z): s.l. *Bradfield* 188B (PRE): *Een* (BM).

NAMAQUALAND. Bethany Drift *Pearson* 6037 (K): Groot Derm *Pillans* 5280 (BOL).

CLANWILLIAM. Wuppertal *Leipoldt* 695 (SAM).

CALVINIA. Bushmanland *Burke & Zeyher* (CGE).

PRIESKA. Prieska *Bryant* J237 (K.PRE), 543, 600 (K): Niekerks Hope *Bryant* J84 (PRE).

KENHARDT. Hagbult *Story* 1154 (PRE).

- HERBERT. Douglas *Orpen* 99 (SAM): Olifantshoek *Lawson* (PRE).
 HAY. Asbestos Mts. *Burchell* 2022 (G.K.): Langeberg *Acocks* 2081 (PRE): Dunmurray *Wilman* (SAM).
 MAFEKING. Mosesh *Wilman* (PRE).
 VRYBURG. Armoedsvlakte *Foley* 2809 (PRE).
 BARKLY WEST. Newlands *Paton* (PRE): Schietpan *Acocks* 1641 (PRE).
 COLESBERG. Colesberg *Knobel* (K): *Shaw* (K).
 WILLOWMORE. Baviaanskloof *Adamson* 5196.
 MIDDELBURG. Grootfontein *Theron* 138 (PRE).
 VICTORIA WEST. Victoria West *Comins* 824 (PRE).
 TULBAGH. Waterfall *Schlechter* 1445 (Z).
 STELLENBOSCH. Somerset West *Parker* 4469 (K).
 FAURESMITH. Berg Riv. *C. A. Smith* 5455 (PRE): Veld Res. *Henrici* 4615 (PRE).
 HOOPSTAD. Hoopstad *Goossens* 1287 (PRE).
 KROONSTAD. Kroonstad *Pont* 177 (PRE.Z).
 HEILBRON. Maccauvlei *Brandmuller* 120 (PRE).
 O.F.S. s.l. *Barker* (K).
 BLOEMHOF. Christiana *Burt-Davy* 14448 (PRE): *Theron* 439 (PRE): *Leistner* 120 (PRE).
 PRETORIA. Pretoria *Repton* 353, 3563 (PRE).
 RUSTENBURG. Rustenburg *Nation* 304 (K): Sandfontein *Schlechter* 4245 (G.K.Z): Steenbokfontein *McAfee* 1912 (G).
 NELSPRUIT. Komati Poort *Moss & Rogers* 606 (BM).
 WATERBERG. Sepani *Brierly* (BM): Warmbad *Leendertz* 2088 (CGE).
 PIETERSBURG. Molopo *Junod* (Z).
 ZOUTPANSBERG. Zoutpan *Schweickerdt & Verdoorn* 532 (PRE): Messina *Rogers* (S): Dongola *Pole-Evans* 4551 (PRE): Dwars Riv. *Burke* (K).
 BASUTOLAND. Leribe *Phillips* 871 (SAM): Pika *Dieterlen* 978 (SAM).
 BECHUANALAND. Mochudi *Rogers* 6895 (G.K.Z): Kwabe *Lugard* 86 (K): Francistown *Rand* 75 (BM): Letshoroma *Curson* 317 (PRE).
 Without locality:—*Burmann* (G): *Burke & Zeyher* 613, 622 (CGE): *Drege* (BM.K.OXF): *Commerson* (G): *Pearson* 4296 (K): *Thomson* (K): *Walker* (K): *Zeyher* 613 (BM.K), 622 (BM.G.K.SAM.Z).

Var. **walteri** (Friedr.) Adamson comb. nov.

M. walteri Friedr. Bot. Mitt. Munch. 12: 65. 1955.

Differs in having many spreading rather rigid stems with internodes 1—2 cm. long, leaves in whorls of 4—6, linear, flat, obtuse, distinctly narrowed to the base, with the midrib projecting below, and flowers 2—3 mm. long, usually with 10 stamens.

The type is *Walter* 2402 (M).

Apparently confined to S.W. Africa and Angola.

S.W. AFRICA. Aus *Hobart-Hampden* 14 (BM); Kl. Karas *Macdonald* 150 (BM); *Ortendal* 93 (K.SAM); Holoog *Pearson* 3603 (K); Haikamschab *Galpin & Pearson* 7460 (K); Harzanus *Dinter* (Z); Gt. Namaqualand *Fenchal* 169 (Z); *Lindereth* 162 (Z).

(*M. verticillata* L. Prostrate. Larger than *M. cerviana*. Leaves in whorls, lanceolate, 1—4 cm. long, 0.1—0.5 cm. wide. Cymes axillary, 3-flowered, with no peduncle, the pedicels shorter than the leaves. Stigmas as long as the ovary. Recorded from tropical Africa but not so far collected in the south.)

2. *M. nudicaulis* Lam. Enc. Meth. 4: 234. 1797.

Pharnaceum bellidifolium Poir. Enc. Meth. 5: 262. 1804.

M. bellidifolia Ser. DC. Prod. 1: 391. 1824.

A glabrous pale green herb with basal leaves and erect branching leafless inflorescences. Leaves many, more or less appressed to the ground, obovate, 3—6 cm. long, 0.9—1.5 cm. wide, obtuse or subacute narrowed to the base. Inflorescences 8—20 cm. high, leafless, green, forking 2 or 3 times, the branches erect or ascending. Flowers solitary on pedicels 1—1.5 cm. long. Flowers rounded, green, about 3 mm. long. Stigmas 3, short, thickened. Fruit slightly longer than the perianth. Seeds compressed, ovate, finely granulate.

A weed of tropical Africa occurring in the northern parts.

TVL. ZOUTPANSBERG. Zoutpan *Schweickerdt & Verdoorn* 584 (PRE); Dongola *Codd & Dyer* 3845 (PRE).

WATERBERG. Naboomspruit *Galpin* M153 (K).

NELSPRUIT. Nelspruit *Acocks* 16680 (PRE); Komati Poort *Moss & Rogers* 607 (BM); Skukusa *Codd & de Winter* 4983 (PRE); Kruger Nat. Pk. v. d. *Schyff* 1615 (PRE).

S.W. AFRICA. Ameiba Erongo *Dinter* 6850 (BM.G.K.PRE.Z); Grootfontein *Schonfelder* S442 (PRE); Kakanstal *Dinter* 8233 (K); Ombatjipuro *Dinter* 516 (Z); s.l. *Bradfield* 379 (PRE).

BECHUANALAND. Mochudi *Rogers* 6458 (G.PRE); Kwabe *Lugard* 153, 156 (K).

3. **M. pusilla** (Schltr.) Adamson comb. nov.

Pharnaceum pusillum Schltr. Bot. Jahrb. 27: 123. 1900.

A small scapose annual, 4—10 cm. high, very often red. Leaves in a basal rosette, oblong or obovate, 0.5—1 cm. long, 0.2—0.3 cm. wide, rounded or subacute at the tip, narrowed at the base to a petiole 1—3 mm. long. Stipules very small, almost entire, soon deciduous. Flowering stems 1—3, very slender, usually with a whorl of small linear leaves at the top of a peduncle 2—3 cm. long. Inflorescence 2 or 3-chotomous the branches pseudoracemose. Pedicels slender, 1—1.5 cm. long, divaricate or deflexed at the fruiting stage. Perianth segments 2 mm. long, obtuse. Anthers very short. Stigmas very short. Fruit almost spherical, not longer than the perianth. Seeds black, smooth, orbicular-pear-shaped.

The type is *Schlechter* 8664 B, lectotype BM.

Open sand on the western coastal belt. Rare and easily overlooked. Originally described under *Pharnaceum* but diverges from that in the small entire stipules, the lack of a disc, the very short stigmas, and the seeds.

NAMAQUALAND. Ezelbank *Bolus* 8998 (BOL.K).

CLANWILLIAM. Baartjies Riv. *Schlechter* 8664 (BM.BOL.G.K.S.Z): Rondegat *Schlechter* 5046 (BM.BOL.G.K.S.Z).

CAPE. Rondebosch *Levy* 3635, s.n. (CT): Noah's Ark Battery *Wolley-Dod* 2906 (BM.BOL.K).

4. **M. namaquensis** Bolus Bot. Jahrb. 27: 121. 1900.

A small glaucous glabrous annual 2—4 cm. high. Leaves basal, erect, succulent. 4—5 mm. long, oblanceolate, subacute, narrowed at the base to a short petiole: stipules entire, very small. Flowering stems 1—3, forked, the branches pseudoracemose, secund, rigid, with alternating flowers. Peduncle about 1 cm. long, with 1—4 small leaves at the top. Pedicels 3—4 mm. long. Flowers rounded, 1—2 mm. long. Stigmas very short. Fruit pointed, slightly shorter than the perianth. Seeds almost orbicular, compressed, bordered.

The type is *Bolus* 6641 B; neotype *Bolus* 6641 (BOL).

Open soil in the N.W. Cape. Rare and easily overlooked. A short-lived annual.

NAMAQUALAND. Nabapeep *Bolus* 6641 (BOL.K.Z).

CLANWILLIAM. Hoek *Schlechter* 8714 (BM.BOL.G.K.Z).

5. **M. tenella** Bolus Bot. Jahrb. 27: 122. 1900.

A green glabrous annual. Leaves 3—8, basal, green, thin, 1—3 cm. long, 0.3—0.5 cm. wide, oblanceolate, acute, much narrowed to the base,

usually erect. Inflorescences several, 6—7 cm. high, very slender, leafless or with 1—4 very small leaves at the lowest node, the branches thread-like. Flowers pseudoracemose, distant, secund. Pedicels 2—3 mm. long, often parallel to the axis and the flowers apparently sessile. Perianth segments 1.5—2 mm. long, green. Stigmas very short.

The type is *Bolus* 6646 B, neotype *Bolus* 1159 (BOL).

Sheltered places among rocks at the margin of the karroo.

An ephemeral with a short active period. When the flowers open the inflorescence is not longer than the leaves but elongates in the later phases.

S.W. AFRICA. Gt. Namaqualand *Fleck* 787 (Z).

NAMAQUALAND. Kamieskroon *Acocks* 16487 (K.PRE): Klipfontein *Bolus* 1159 (BM.BOL.K.Z).

CALVINIA. Lakenberg *Acocks* 17230 (PRE).

VAN RHYNSDORP. Van Rhyns Pass *Adamson* 4549; Kareeberg *Schlechter* 8240 (BM.K.Z).

CLANWILLIAM. Pakhuis *Adamson* 4520; *Schlechter* 8631 (BM.Z), 8671 (K); Grays Pass *Schlechter* 8240 (BM.K.Z).

PIKETBERG. Saron *Adamson* 1043.

CERES. Karroo Poort *Adamson* 4564.

SWELLENDAM. Storms Vlei *Adamson* 4531.

Without locality:—*Drege* (*P. subtile*) (G).

PHARNACEUM

L. Sp. Pl. 272. 1753; *emend.* Fenzl Ann. Wien. Mus. 2: 243. 1840. Ginginsia DC. Mem. Soc. Nat. Hist. Paris 4: 184. 1828; Prodr. 3: 362. 1828.

Perennials sometimes woody, less often annual. Leaves on the stems alternate or in whorls, linear or less often ovate or oblong. Stipules membranous, usually free from the leaf-base, persistent, generally cut into lobes or hairs at least at the edges. Inflorescence pedunculate, compound cymose, with whorls of leaves or stipules at the nodes, the ultimate branches pseudoracemose. Perianth segments free or connate at the base, green or brown outside, white or rarely coloured inside. Stamens free from and alternate with the perianth segments. Ovary superior, surrounded by a 3 or 5-lobed nectariferous disc, the disc rarely wanting. Stigmas 3—5, flat or often revolute and apparently cylindrical. Seeds orbicular, glabose or biconvex, with no aril and a short funicle.

The type species is *P. incanum* L.

Confined to southern Africa with a range from the south coast to Rhodesia. Absent from the tropics. The greatest concentration of species is on the southern and western coastal belts and the adjacent margins of the karroo.

Closely related to *Mollugo* but distinguished by the persistent lacerate stipules, the larger more conspicuous flowers, the presence of the disc, the revolute stigmas, and orbicular seeds. There is much greater variety in habit. Many of the species are drought resistant.

In many of the species the flowers open only in the later part of the day, in some at or about sunset. The flowers when closed are inconspicuous.

In the course of this investigation it has been found that certain features that were stressed for the classification by earlier workers are not reliable. For example, both Fenzl (l.c.) and Sonder (Fl. Cap. 1: 138. 1860) made use of the length of the stem as a diagnostic feature. It has been found that for several species this is quite unreliable. Leaf and especially stipule features have been found much more satisfactory. Certain species recognized by Fenzl and by Sonder have been found to be aggregates which are here segregated. This has led to an increase in the number of recognized species. Fenzl described 13. Sonder raised the number to 16 though one of these has since been shown to belong to another genus (cf. Adamson J. S. Afr. Bot. 23: 13. 1957). In this account 25 species are recognized of which 5 are described for the first time. Some new varieties are also described.

The earlier workers divided the genus into sections which were based upon growth habit but which were not given names (e.g. Sonder Fl. Cap. 1. c.; Pax & Hoffmann Engl. & Prantl Nat. Pflanzf. ed. 2. 16. c: 227. 1934). Examination of much material has shown that two species differ in features of sufficient importance to constitute two distinct sections. One of these has recently been regarded as of generic rank.

KEY TO THE SECTIONS.

1. Inflorescence pedunculate, much longer than the leaves:
perianth segments with no dorsal projection.
 2. Flowers with a 3—5-lobed disc below the ovary . . . 1. *Pharnaceum*
 2. Flowers with no disc; leaves linear, whorled . . . 2. *Spergulopsis*
1. Inflorescence sessile or with a peduncle shorter than the leaves:
perianth segments with a dorsal projection behind the tip . . . 3. *Suessenguthiella*

Sect. 1. **Pharnaceum**

Inflorescence with a peduncle much longer than the leaves, many-flowered. Perianth segments with no dorsal projection. Disc present below the ovary.

The type species is *P. incanum* L.

Much the largest of the sections. Variable in habit. Leaves alternate or whorled.

KEY TO THE SPECIES.

1. Leaves alternate on the stem or in a basal rosette, in whorls only in the inflorescence.
 2. Perennial: stems woody, at least at the base.
 3. Leaves flat, rigid, erect, in a basal rosette: stipules caducous 15. *alpinum*

3. Leaves linear or filiform: stipules persistent.
 4. Stipules entire or with 1—2 lateral points: stems short, woody: leaves rather rigid . . . 13. *detonsum*
 4. Stipules cut into hairs or narrow lobes at the top or edges.
 5. Stipular hairs curled and entangled as a woolly mass.
 6. Stipular hairs covering the stem: leaves short, squarrose: stems erect, woody 1. *microphyllum*
 6. Stipular hairs not covering the stem, forming axillary tufts or bunches.
 7. Stipular hairs forming a dense axillary mass 2—6 mm. long: leaves filiform, ascending: stems woody at the base only 2. *lanatum*
 7. Stipular hairs forming a very small tuft less than 2 mm. long: leaves rigid, spreading or falcate: stems woody 3. *albens*
 5. Stipular hairs straight or if curled not entangled or woolly.
 8. Leaves distant: stipules small, usually inconspicuous: stems woody, usually tall.
 9. Stems white: stipules slightly sheathing at the base, with fine hairs at the top.
 10. Leaves spreading or reflexed, short: stipules very short: flowers 2—3 mm. long 3. *albens*
 10. Leaves ascending, longer: stipules with long hairs: flowers 3—4 mm long 4. *aurantium*
 9. Stems not white: stipules not sheathing.
 11. Leaves soft, green: stipules adnate to the leaf-base, ciliate with short hairs: perianth segments distinctly connate 5. *viride*
 11. Leaves soon deciduous: stipules free from the leaf-base, entire with a fringe of short hairs: perianth segments free 6. *rubens*
 8. Leaves crowded, linear-revolute or filiform: stem short, if elongated the leaves very crowded.
 12. Stipules large, persistent after leaf-fall, covering the stem or surrounding the older leaves: stems short, little branched . . . 16. *brevicaule*
 12. Stipules not persistent after leaf-fall, not surrounding the older leaves.
 13. Stipules thin, translucent, white.
 14. Stipules cut to the base into narrow lobes or hairs 8. *elongatum*

14. Stipules with an entire basal part, cut at the top into fine hairs: seeds globes-convex usually shining.
15. Stems erect, in bunches: stipules partly adnate to the leaf-base: flowers 2—3 mm. long: stigmas revolute, not widened at the tip 7. *incanum*
15. Stipules free from the leaf-base: flowers 3.5—4 mm. long: stigmas flat, distinctly widened to the tip.
16. Stems usually erect: leaves filiform: stipules half as long as the leaves 9. *confertum*
16. Stems short, branched, on the ground: leaves short, stout, revolute: stipules less than half as long as the leaves 9. *confertum* var. *brachyphyllum*
13. Stipules firm, opaque, white or brownish, sheathing at the base.
17. Stipules ending in a fringe of longish hairs: stems usually erect: seeds flattened biconvex, granulate 10. *dichotomum*
17. Stipules small, with short hairs: seeds globose-biconvex, shining.
18. Stems usually prostrate: leaves squarrose: stipules with a few coarse hairs at the top, free from the leaf-base 12. *trigonum*
18. Stems erect: leaves ascending: stipules ciliate with few hairs, adnate to the leaf-base 14. *ciliare*
2. Stems quite herbaceous, short: leaves basal and in whorls on the inflorescence: usually annual.
19. Stipules acuminate, entire or lacerate at the sides: flowers 3—4 mm. long. perianth reflexed at anthesis 17. *croceum*
19. Stipules short, cut into lobes or hairs: flowers about 2 mm. long: perianth not reflexed.
20. Basal leaves all linear or filiform.

- 21. Basal leaves terete: stipules triangular acuminate: stems erect, rigid 18. *gracile*
- 21. Basal leaves flat: stipules cut into lobes: fruit longer than the perianth: seeds shining 20. *exiguum*
- 20. Outer basal leaves lanceolate-oblong, the inner linear: fruit not longer than the perianth: seeds finely rugose 19. *subtile*
- 1. Leaves in whorls along the stem, with or without a basal rosette: prostrate or sprawling plants.
- 22. Leaves linear of filiform.
 - 23. Leaves filiform or linear-revolute: stipules sheathing at the base, inflorescence terminal 10. *dichotomum*
 - 23. Leaves linear-oblong, flat or revolute: stipules not sheathing: inflorescence terminal or lateral 11. *fluviale*
- 22. Leaves ovate, obovate or oblong, at least 2 mm. wide.
 - 24. Quite herbaceous: leaves obtuse, mostly opposite: stipules bristle-like: flowers small, often solitary: small creeping herb 23. *serpyllifolium*
 - 24. More or less woody at the base: leaves in whorls of 4—6: flowers not solitary.
 - 25. Leaves oblong or elliptical, thin, acute: stipules cut to the base into lobes or hairs 21. *Thunbergii*
 - 25. Leaves obovate, thick, obtuse: stipules with short teeth at the top 22. *cordifolium*

1. ***P. microphyllum*** L.f. Supp. Pl. 185. 1781.

Mollugo microphylla Ser. DC. Prodr. 1: 392. 1824.

Ginginsia microphylla DC. Prodr. 3: 368. 1828.

! *P. pruinoseum* Haw. Pl. Succ. Supp. 15. 1819.

A woody erect straggling shrublet, up to 50 cm. high, with few or occasionally many erect or spreading branches, the younger white. Leaves close but not crowded, short, 3—7 mm. long, 1.5 mm. wide, narrow-elliptical, squarrose or falcate, deciduous on the older parts. Stipules white, cut into long entangled woolly hairs that cover the stem and partly also the leaves, the hairs on a short sheathing basal part. Stipules persistent after leaf-fall. Inflorescences on peduncles 2—10 cm. long, with a tuft of woolly stipules but no leaves at the top. Flowers often numerous, more or less umbellate. Perianth segments 3—4 mm. long, broad, obtuse. Disc of 3 broad obtuse lobes. Stigmas short, thick, slightly widened to the tip. Fruit almost spherical, slightly longer than the perianth.

The type is in herb. *Linn.* (387:8).

On sand, mostly near the coast, in the N.W. Cape.

A very distinctive species in habit. *P. pruinoseum* Haw. from the description seems to be this species. The type is lost.

NAMAQUALAND. Witbank *Pillans* 5206 (BOL): Horus Rd. *Pillans* (BOL.18037). Hondeklip Bay *Pillans* (BOL.18035-6. 18039).

CLANWILLIAM. Crystal Pool *Barnes* (BOL).

PIKETBERG. Elands Bay *Barker* 2625 (BOL).

MALMESBURY. Geelbek *Compton* 19907 (BOL).

Without locality:—*Burmahn* (G): *Masson* (BM): *Montini* (S): *Pappe* (SAM): *Thunberg* (BM.S): *Zeyher* 78 (S).

Var. **albens** Adamson var. nov.

A typo differt caulibus diffusis ramulis brevissimis numerosis, foliis perbrevis in ramulis positus, stipulis foliis longioribus pilis lanatis brevibus.

White. Stems sprawling with ascending branches bearing numerous short shoots 3—5 mm. long. Leaves on the short shoots, 2—3 mm. long. Stipules longer than the leaves, almost entire, undulate, with a fringe of short woolly hairs.

The type is *Schlechter* 10114 (BM).

CERES. Sand River, Cold Bokkeveld *Schlechter* 10114 (BM.G.K.Z).

2. **P. lanatum** Bartl. *Linnaea* 7: 625. 1832.

Stems erect or sprawling, mostly solitary, woody at the base only, 15—50 cm. high, or up to 1.5 m. when among bushes. Young stems white. Leaves not crowded, often with axillary fascicles, linear, revolute or rolled, 0.5—5 cm. long, commonly 1—2 cm., ascending, hair-pointed. Stipules 3—8 mm. long, with many long woolly hairs forming a loose or dense entangled axillary tuft, arising from a small entire not sheathing basal part. Peduncles stout, 5—12 cm. long, usually with a whorl of leaves at the top. Inflorescence usually umbellate, with 3—8 branches either simple or bearing umbellate cymes. Flowers rather crowded. Pedicels 1.5—2 cm. long, deflexed at the fruiting stage. Perianth segments about 4 mm. long, distinctly connate at the base. Disc of 5 small obtuse lobes. Stigmas thick, revolute. Fruit ovoid, 5—6 mm. long, longer than the perianth. Seeds brown or black, globose-biconvex, shining, with a distinct border.

The type is *Sieber* 239 (S).

Fixed sanddunes along the western coastal belt, usually among bushes, rarely in the open.

NAMAQUALAND. Witbank *Pillans* 5223 (K): 5225 (BOL): Leliefontein *Esterhuysen* 1343 (BOL): Hondeklip Bay *Adamson* 5037: Brakfontein *Ecklon & Zeyher* 18 (S): *Zeyher* (S): Garies *Leighton* 1128 (BOL): s.l. *Scully* 218 (BM).

CLANWILLIAM. Clanwilliam *Leipoldt* 275 (BOL): *Mader* s.n. (SAM): *Schlechter* 8906 (BM.K): Pakhuis *Esterhuysen* 2387 (BOL): Olifants Riv. *Pappe* (SAM): *Schlechter* 5003 (BM.BOL.G.K.S.Z): Warm Baths *Stephens* (K): Grays Pass *Leipoldt* 3254 (BOL).

CERES. Laken Vlei *Compton* 12085 (BOL).

BEAUFORT WEST. Nieuwveld *Zeyher* 2496 (S).

HOPEFIELD. Saldanha Bay *Ecklon & Zeyher* 1824 (G.K.OXF. SAM): s.n. (S); *Wilman* (BOL): *Zeyher* (S): *Hopefield Bachmann* 2103, 2135-6 (Z): *Bolus* 12698 (BOL): *Letty* 17 (PRE): *Darling Adamson* 4950: *Mamre Adamson* 4945.

STELLENBOSCH. Sarepta *Acock* 708 (S): Somerset West *Sieber* 239 (S): Strand *Parker* 3907 (K): Hottentots Holland *Zeyher* (S).

CAPE. Strandfontein *Compton* 13696 (BOL): Melkbosch Strand *Adamson* 4673, 3677: Riet Valley *Ecklon & Zeyher* 1823 (S): Cape Flats *Pappe* (BOL): *Phillips* 4614 (SAM): *Zeyher* (SAM): Tygerberg *Adamson* 4667: Milnerton *Adamson*: Houtbay *Adamson* 2970 (CT): *Salter* 1734 (K): Camp Ground *Guthrie* 1355 (K): *Wolley-Dod* 253 (BOL.K): Fishhoek *Salter* 271/4 (BM): Simonstown *Wright* (K): Noordhoek *Godman* 410a (BM): *Kommetjie Adamson* 2910 (CT): *Smiths Farm Salter* 7121 (BOL).

CALEDON. Genadendal *Verreaux* (G).

Without locality:—*Burmman* (G): *Drege* (*Ginginsia grandiflora* a & b) (K): *Ecklon & Zeyher* 78 (S): *Osbeck* (S): *Pappe* (SAM): *Thunberg* (S).

3. *P. albens* L.f. Supp. Pl. 186. 1781.

A straggling woody shrublet, 20—50 cm. high, with few or many branches, the younger white, ridged. Leaves alternate, distant, with internodes 0.4—1 cm. long, dark green or grey, 0.4—0.7 cm. long, squarrose or often falcate, flat or revolute, with deciduous hair points. The older leaves often with small axillary fascicles. Stipules inconspicuous, 1—1.5 mm. long, cut into straight or slightly woolly hairs, sometimes yellowish, deciduous on the older leaves. Inflorescence umbellate or compound umbellate, with 3—6 branches, the ultimate pseudoracemose. Peduncle 5—8 cm. long, stout. Perianth segments about 3 mm. long. Disc 5-lobed, the lobes indented or minutely toothed. Stigmas white, slightly widened to the tip. Fruit rounded 4 mm. diam., longer than the perianth. Seeds brown, shining, flattened biconvex, with a distinct border.

The type is in herb. *Linn.* (387:9).

Open places among rocks, rarely on sand, in the N.W. Cape and S.W. Africa.

The species was originally described as having no stipules which has led to considerable confusion. It was united with the following one by both Fenzl and by Sonder but is readily separable on the habit, the short squarrose leaves, the very small stipules, and the small flowers.

S.W. AFRICA. Aus *Dinter* 6074 (BOL.G.K.PRE.S): Gubab *Dinter* 1010 (Z): Gt. Karasberg *Pearson* 8593 (BM.BOL.K): Kl. Karas *Dinter* 3185 (SAM). 4689 (S).

NAMAQUALAND. Okiep *Bolus* 9519 (BOL.K): Copperberg *Drege* (S): *Pillans* 5660 (BOL): Springbok *Lewis* (SAM): Tweefontein *Pearson* 3787 (K): Bowersdorp *Stokoe* (SAM): Garies *Acocks* 16463 (PRE): *Adamson* 5064: Bitterfontein *Pearson* 3414 (BM.K): s.l. *Morris* 5650 (K): *Scully* 1160 (BM.BOL.G.K.SAM).

CALVINIA. *Calvinia Johanssen* 4415 (SAM): *Schmidt* 269 (PRE); Akkerdam *Acocks* 15118 (K.PRE): Lokenberg *Story* 4398 (PRE).

VAN RHYNSDORP. Nardouw *Compton* 17143 (BOL).

CLANWILLIAM. Brandewyn Riv. *Barker* 4736 (BOL): Keerom *Esterhuysen* 17943 (BOL).

HAY. Langeberg *Hunter* 5 (PRE).

Without locality:—*Drege* (*Ginginsia conferta* c) (CGE.K.OXF), s.n. (SAM): *Masson* (BM): *Niven* 38 (BM): *Thunberg* (S).

4. ***P. aurantium*** (DC.) Druce Rep. Bot. Ex. Cl. Brit. Is. 1916. 639. 1917.

Ginginsia aurantia DC. Mem. Soc. Hist. Nat. Paris 4: 188: 1828.

P. lineare Andrews Bot. Rep. t.326. 1802 non L.f.

P. reflexum Ecklon & Zeyher Enum. 285. 1837.

A sprawling or suberect shrublet, 10—80 cm. high, with lax branching. Young stems white or pale-coloured. Leaves not crowded, ascending, 1—2 cm. long, flat, revolute or rolled, the hair-point deciduous leaving a short mucro. Stipules 2—3 mm. long, entire but with the top and edges cut into long hairs, the hairs not crowded, straight or crisped or occasionally woolly. Peduncles stout, 8—15 cm. long, often purple. Inflorescence umbellate, with 3—6 branches 1—5 cm. long, often again branched, the ultimate branches pseudoracemose. Pedicels 0.5—1 cm. long, often divaricate. Flowers white or pale yellow, opening quite flat. Perianth segments 3.5—4.5 mm. long. Anthers oblong, pale-coloured. Disc of 5 obtuse pale-coloured lobes. Stigmas white, thick, flat or slightly revolute. Fruit round-ovoid, longer than the perianth. Seeds brown, shining, flattened biconvex, with a distinct flattened rim.

The type is Bot. Rep. t.326: of *P. reflexum* E. & Z. 1825.

Stony or gravel soils in the drier regions on the western and south-western coastal belts.

Rather variable in size and in habit. When growing among bushes the stems become much elongated. The flowers open about midday. Allied to and much confused with *P. albens* but distinguished by the larger flowers, longer ascending and less distant leaves, and by the stipules. Resembles *P. lanatum* but distinguished by the stipules. The type figure represents a plant with bright yellow flowers. Of the specimens seen the

greatest part have white flowers: pale yellow flowers have been observed but none the colour depicted.

S.W. Africa. Kl. Karas *Dinter* 4869 (PRE): Keiap Riv. *Pearson* 8577 (BOL): Gt. Namaqualand *Schinz* 2058 (Z).

NAMAQUALAND. Okiep *Bolus* 5649 (K), 9520 (BOL): *Morris* 5649 (BOL.K): Copperberg *Drege* (S): Stinkfontein *Schlechter* 11088 (BM.BOL.G.K.S.Z): Klipfontein *Bolus* 9518 (BOL.K): Springbok *Godman* 712 (BM): Lewis (SAM): Leliefontein *Adamson* 5059: *Hutchinson* 1473 (K): *Rodin* 1473 (BOL.K.PRE): Bowesdorp *Thorne* (SAM): Kamieskroon *Adamson* 5054: *Compton* 13224 (BOL): *MacDonald* 66 (BM): *Pearson* 6774 (K): *Pillans* 6253 (BOL.K): Hondeklip Bay *Adamson* 5033: Garies *Adamson* 5008: Brakdam *Lewis* (SAM): Gamoep *Henrici* 2240 (PRE): s.l. *Bolus* 5650 (K): 9522 (BOL.K): *Levy's* 4709 (CT): *Schlechter* 11191 (BM.G.S): *Wylie* (K).

CALVINIA. Nieuwoudtville *Story* 4398 (PRE): Hantamsberg *Adamson* 4259. Lockenburg *Leistner* (K).

HAY. Langeberg *Acocks* 313 (PRE): Padkloof *Acocks* 2077 (PRE).

HERBERT. Danielskuil *Esterhuysen* 808 (BOL).

CLANWILLIAM. Wuppertal *Drege* (S): Kweek Riv. *Drege* (S): Clanwilliam *Mader* 35 (K): *Schlechter* 8406 (BM.K.Z): Modderfontein *Drege* (S): Greys Pass *Levy's* 1357 (CT).

CERES. Swaarmond *Adamson* 4401: *Levy's* 1155 (CT): Karroo Poort *Acocks* 1694 (S): Hottentots Kloof *Adamson* 5090: Verkeerde Vlei *Adamson* 5091.

WORCESTER. Veld Res. v. *Breda* 33 (PRE).

LAINGSBURG. NGAap Kop *Esterhuysen* 3490 (BOL): Matjesfontein *Foley* 65 (PRE).

HOPEFIELD. Darling *Bolus* (BM).

ROBERTSON. Robertson *Levy's* 4349 (CT).

MONTAGU. Donker Kloof *Levy's* 8042 (CT): Baths Kloof *Page* (PRE): Montagu *Levy's* 108 (CT).

SWELLENDAM. Storms Vlei *Adamson* 4584: *Story* 3084 (PRE): Hasseguas Kloof *Zeyher* 2498 (K.S).

RIVERSDALE. Drede Riv. *Muir* 3751 (PRE).

MOSSEL BAY. Gouritz Riv. *Ecklon & Zeyher* 1825 (S.SAM), 94.12 (S), 99.12 (S).

Without locality:—*Drege* (*Ginginsia albens*) (K), (*G. aurantia* BM.G. K.OXF), (*G. conferta* a) (BM.K), (*G. grandiflora*) (BM.CGE.G.K.OXF) (*P. reflexum* lusus 3) (S), (*P. reflexum* var.) (G): *Osbeck* (S): *Pappe* (G): *Schlechter* 11131 (BM.Z): *Sparrman* (S).

5. **P. viride** Adamson sp. nov.

Caules lignosi laxe ramosi apice solum foliati. Folia alterna viridia stipulis ciliatis basi foliorum adnatis. Flores parvi. Perigonii segmenta connata. Fructus perigonio aequilongus.

Diffuse. Stems 25—30 cm. long, laxly branched, erect or sprawling, woody at the base, leafy at the tips only. Leafy part of the stem 3—5 cm. long, white. Leaves bright green, alternate, not crowded, 0.7—1.2 cm. long, flat or partly revolute, with a short deciduous hair point. Stipules 2 mm. long, adnate to the leaf-base, with a loose fringe of short hairs. Peduncles 4—8 cm. long. Inflorescence umbellate, with slender ascending branches 1—1.5 cm. long. Pedicels 0.4—0.6 cm. long. Perianth segments about 2 mm. long, green externally, obtuse, distinctly connate at the base. Anthers white, broadly oblong. Disc of 3 broad thick truncate yellow or orange lobes. Stigmas white, flat, very slightly revolute. Fruit rounded, about as long as the perianth.

The type is *Acocks & Hafstrom* 432 (S).

Rocks among bushes in the northern Cape and Transvaal.

Distinguished by the lax habit, the soft green not crowded leaves, the stipules, and the small flowers with distinctly connate perianth. Occasionally there is a continuation of the leafy stem from the first node of the inflorescence.

HAY. Postmasburg *Burchell* 2140 (G.K.); Langeberg *Acocks* 2077 (PRE); Clifton *Acocks* 2131 (K.PRE); s.l. *Acocks* 313 (PRE).

HERBERT. Mazelfontein *Acocks* 1906 (K.PRE).

KURUMAN. S. of Khosis *Burchell* 2627 (K).

ZOUTPANSBERG. Wylies Poort *Acock & Hafstrom* 432 (S).

6. **P. rubens** Adamson sp. nov.

Caules lignosi decumbentes nodulosi. Folia alterna vetera fasciculata. Stipulae undulatae breviter ciliatae. Inflorescentia rubra umbellata. Squamae hypogynae tenerrimae. Fructus sphaericus perigonio aequilongus.

A lax decumbent or sprawling shrublet. Stems woody, up to 40 cm. long, the older parts with very short axillary branches forming nodular projections. Leaves confined to the younger parts, filiform, 0.5—0.8 cm. long, not crowded, deciduous except for the terminal tuft and axillary fascicles. Stipules 2 mm. long, entire, acute, usually undulate, the edges with not crowded very fine hairs less than 1 mm. long. Inflorescences many, red. Peduncles 5—8 cm. long, usually without leaves at the top. Inflorescence branches 4—8, umbellate, half of them again umbellate. Pedicels very slender, 1—2 cm. long. Perianth segments 2—3 mm. long.

very slightly connate at the base. Disc pale-coloured, of 3 very thin broad obtuse or slightly indented lobes. Stigmas broad, white, revolute. Ovary sharply three-angled. Fruit almost spherical, about as long as the perianth.

The type is *Acock* 3184 (S).

Sheltered rock ledges in the Cedarberg.

Resembles *P. viride* but distinguished by the stipules, the slender red peduncles, the almost free perianth segments, and the very thin lobes of the disc.

CLANWILLIAM. Kromme Riv. *Acock* 3184 (S).

7. *P. incanum* L. Sp. Pl. 272. 1753. (*sen. strict.*)

Most commonly in many-stemmed bunches, occasionally prostrate. Stems 2—20 cm. long, or rarely up to 40 cm., woody at the base, little or not branched. Leaves alternate, scattered or crowded, slender, filiform, 1—2.5 cm. long, usually spreading, with a deciduous hair point 2 mm. long. Stipules thin, translucent, 1—5 mm. long, partly adnate to the leaf-base but not sheathing, the upper part and sides with many fine straight spreading hairs or very narrow lobes ending in hairs. Peduncles stout, 5—12 cm. long, usually with a whorl of small leaves at the top. Inflorescence branches 3—5, often stout, with whorls of leaves, often dichasially branched but not regularly so. Perianth segments 2—2.5 mm. long. Anthers broadly oblong. Disc of 3, or less often 5, obtuse white lobes. Stigmas white, flat, not revolute. Fruit rounded, about as long as the perianth. Seeds brown or black, shining slightly compressed biconvex.

The type is in herb. *Linn.* (287.5).

Sand or gravel on the western coastal belt.

Rather variable in size. While most commonly erect, shade forms may be prostrate with much elongated stems, long scattered leaves and relatively shorter stipules. The flowers open at or about sunset. In the past most authors have treated '*P. incanum*' as an aggregate species. DeCandolle (Mem. Soc. Hist. Nat. Paris 4: 187. 1828) first made a separation of the constituents, a scheme that is now followed. Fenzl, though he placed them all under one species, recognized the segregates as unnamed forms (Ann. Wien. Mus. 2: 243. 1840). The present species agrees completely with Linnaeus' own specimen in his herbarium. It is distinguished from the allied species by the habit, the stipules, the small flowers, and the compressed seeds.

NAMAQUALAND. Kamiesberg above Garies *Adamson* 5088.

CLANWILLIAM. Graafwater *Schlechter* 8566 (BOL.G.K.S.Z): Barrage *Adamson* 4957: Pakhuis Pass *Adamson* 4963, 5071, 5074-5-6: Grays

Pass Pearson 5222 (K): Warmbaths Stephens 6880 (BM.K), 6883 (K): Clanwilliam Rogers 16787 (Z).

PIKETBERG. Piketberg Edwards 171 (K.Z): Saron Schlechter (G).

TULBAGH. Tulbagh Pappe (K).

WORCESTER. Orchard Rogers 16516 p.pt. (Z).

HOPEFIELD. Hopefield Letty 37 (PRE).

Without locality:—Burmah (G): Drege (*Ginginsia microphylla*) (G.K.p.pt. OXF) (*G. elongata*) (BM.K.OXF.S): Ecklon & Zeyher (CGE): Delessert (G): Roxburgh (G): Ventenat (G): Verreaux (G).

8. ***P. elongatum*** (DC.) Adamson comb. nov.

Ginginsia elongata DC. Mem. Soc. Hist. Nat. Paris 4: 187.t. 18. 1828. Prodr. 3: 363. 1828.

P. incanum auct. non L. herb. (Adamson in Fl. Cap. Pen. 366. 1950)

Usually low-growing, sprawling or prostrate. Stems 3—25 cm. long, branched, woody at the base only, the youngest white. Leaves alternate, crowded especially at the top of the stem, linear-filiform, 0.4—3 cm. long, usually spreading. Stipules thin, translucent, cut to the base into narrow multifid lobes or straight hairs, the lobes ending in straight hairs. Stipules with no entire basal part, quite free from the leaf-base, variable in length from short to almost as long as the leaves. Peduncels 5—25 cm. long, slender, usually with a whorl of leaves at the top. Inflorescence branches 3—5, some with whorls of leaves and again branched; the ultimate branches pseudoracemose. Pedicels slender, 0.3—1 cm. long, often secund, deflexed at the fruiting stage. Perianth segments about 3 mm. long. Disc red or yellow, of 3 or 5 obtuse truncate segments. Stigmas red or yellow, erect, revolute and apparently cylindrical, 1—2 mm. long. Fruit ovoid, longer than the perianth. Seeds black, shining, globose-biconvex.

The type is *Lambert* (1816) (G).

Sand, gravel or less commonly on rocks on the S.W. coastal belt.

The flowers open in the late afternoon. Very variable in size and in habit, especially in relation to habitat. Plants growing among bushes may be quite erect, in dry situations the stems are short and the leaves short with prominent stipules. Sometimes leaves are confined to the apical tuft. Shade forms may be quite herbaceous. All intermediates are to be found. A form from rocky sites which has very short leaves with no comal tuft looks superficially distinct. The type specimen is of a shade form with small stipules with only 2—4 lobes. All stages of transition occur between this and the common forms with rather prominent stipules. *P. elongatum* is the commonest of the forms which have been grouped under '*P. incanum*'.

NAMAQUALAND. Garies *Adamson* 5065, 5067.

VAN RHYNSDORP. Klaver *Lavis* (BOL.K):

CLANWILLIAM. Zeekoe Vlei *Levy's* 1196, 1216 (CT).

TULBAGH. Tulbagh *Zeyher* (SAM).

MALMESBURY. Hopefield *Bachmann* 1505, 2213 (Z); Darling *Adamson* 4949; Mamre *Adamson* 4951; Salter 1243 (K); *Waserfall* 977 (PRE); Malmesbury *Acock* 2527 (K); *Schlechter* 5350 (G.K.Z).

CAPE. Cape Flats *Purcell* (Z); Bellville *Wall* (S); Milnerton *Hafstrom* (S); Killarney *Adamson* 4666; Cape Town *Bolus* 2719 (BOL.SAM); Table Mt. *Adamson* 981 (CT); *Ecklon* 64.9 (S); 90.9 (S), 626 (G.K); *Ecklon & Zeyher* 1822 (S.SAM); s.n. (SAM); *Garside* 16150 (K); *MacGillivray* 645 (K); *MacOwan* 819 (BM.G.K.SAM); *Moss* 8082 (BM); *Page* (CT); *Rehmann* 852, 857 (Z); *Rogers* 16158 (K); *Pillans* (Z); Kasteel Poort: *Wolley-Dod* 1360 (BOL.K); Kloof Nek *Hafstrom* (S); Lion's Head *Hafstrom* (S); *Wolley-Dod* 3091 (BOL); Signal Hill *Burchell* 134 (K); Devils Peak *Bolus* 819 (BOL); Green Point *MacOwan* 2973 (G.Z.), s.n. (Z); *Prior* (K); Rocklands *Piese* (K); Hout Bay *Bolus* (CT); Llandudno *Adamson* 485 (CT); *Compton* (CT); Karbonkelberg *Adamson* 2967; Salt Riv. *Burchell* 644 (K); Raapenburg *Guthrie* 840, 846 (CT); Camp Ground *Compton* 13898 (PRE); Newlands *Zeyher* 2497 (S); Wynberg *Caporn* (CT); Constantia *Ecklon & Zeyher* 1822 (S); *Zeyher* (S); Retreat *Worsdell* (K); Muizenberg *Kensit* (CT); *Schlechter* 1246 (Z); Clovelly *Adamson* 4944, *Rogers* 29863 (PRE); Fishhoek *Hafstrom* (S); Simonstown *Adamson* 1591 (CT); *Godman* 82 (BM); *Milne* 211 (K); *Wolley-Dod* 254 (BM.BOL); Red Hill *Adamson* 4758; Noordhoek *Godman* 344 (BM); Smitswinkel Bay *Adamson* 5158-9-60; Patrys Vlei *Adamson* 2935; Vasco da Gama Pk. *Adamson* 2866; s.l. *Salter* 271.5 (BM).

STELLENBOSCH. Tiervlei *Acock* 742 (S); Stellenbosch *Burchell* 1-964 (K); *Marloth* 3317 (Z), s.n. (BM.G); *Worsdell* (K); Stellenbosch Flats *Garside* 675 (K); Jonkershoek *Adamson* 3515; Gordons Bay *Adamson* 4686.

CALEDON. Sir Lowry Pass *Schlechter* 1120 (BM.K.Z); Caledon *Ecklon* (S); *Rogers* 30115 (K.p.pt); Stanford *Collett* 4171 (PRE); Genadendal *Verreaux* (G); Hermanus *Rogers* 26585 (Z).

WORCESTER. De Doorns *Bolus* 13112 (K); Hex Riv. *Tyson* 663 (SAM.p.pt); Goudini Baths *Adamson* 4411.

ROBERTSON. Bosmans Kloof *Esterhuysen* 4484 (BOL).

MONTAGU. Kogmans Kloof *Adamson* 4646.

SWELLENHAM. Swellendam *Verreaux* (G).

RIVERSDALE. Albertinia *Adamson* 4854. *Muir* 1593 (K.PRE).

UITENHAGE. Uitenhage *Bowie* (BM).

ALBANY. Kowie West *Burt-Davy* 7945 (PRE).

Without locality:—*Alexander* (BM.PRE): *Auge* (BM): *Ball* (BM): *Bowie* (BM): *Burmman* (G): *Drege* (*Ginginsia elongata*) (G.K), (*G. grandiflora*) (K), (*P. incanum* b) (SAM), (*P. incanum lusum* 3) (S): *Ecklon* (S.Z): *Ecklon & Zeyher* 1821 (G.OXF): *Elliot* (G): *Forbes* (CGE): *Gray* (K): *Harvey* 612 (K): "Hort. Kew" (BM): *Krebs* (G): *Lambert* (G): *Ludwig* (OXF): *Niven* (BM): *Nylstrom* (S): *Oldenburg* (BM): *Osbeck* (S): *Payne* 113a (S): *Pappe* (K): *Sieber* 210 (G.K.S): *Sparrman* (S): *Thom* (K): *Thunberg* (S): *Verreaux* (G): *Zeyher* 612 (K), 626 (S).

9. ***P. confertum*** (DC) Ecklon & Zeyher Enum. 283. 1837 (*emend.*).

Ginginsia conferta DC. Mem. Soc. Hist. Nat. Paris 4: 188. 1828. Prodr. 3: 363. 1828.

In low rounded clumps or bunches. Stems many, woody, 5—12 cm. long, ascending or erect, usually branched, the younger appearing white or hairy owing to the prominent stipules. Leaves alternate, usually crowded 0.5—1.5 cm. long, spreading. Stipules 3—6 mm. long, thin, translucent, the lower part entire, partly sheathing, the upper part and sides cut into fine straight hairs 1.5—3 times as long as the basal part. Stipules very slightly adnate to the leaf-base. Peduncles stout, red or purple, 4—12 cm. long, with a whorl or partial whorl of leaves at the top. Inflorescence lax, spreading, usually with 3 main branches again branched, the ultimate pseudoracemose. Flowers numerous. Perianth segments 3.5—4 mm. long. Disc 3-lobed, the lobes acute or with a raised central point, red or orange. Stigmas large, red or orange, wedge-shaped, flat. Fruit 4—5 mm. long, about as long as the perianth. Seeds black, shining, globose-biconvex.

The type is Bot. Mag. t.1883 (*Loddiges* (G)).

Dry sand or gravel or among rocks in the N.W. Cape.

The flowers open about sunset. In the older stages the leaves become bright red.

This has been most often merged in the aggregate species '*P. incanum*' but is distinguished by the prominent stipules, the rather large flowers, the disc, and the broad stigmas. Though Ecklon & Zeyher transferred DeCandolle's species to the genus *Pharnaceum*, it appears that they did not understand it. The specimens they distributed (1822) under this name are *P. elongatum* and the localities they quote certainly refer to that species.

NAMAQUALAND. Springbok *Magennis* (Z): Kasteels Poort *Bolus* 9517 (BOL.Z): Groot Vlei *Lewis* (SAM): Copperberg *Drege* (*Ginginsia conferta*) (K): Honderklip Bay *Adamson* 4995, 5039, 5040: Wallekraal *Adamson* 5022, 5028: Kamiskroon *Adamson* 5055: *Lewis* (SAM): *Salter* 1497 (BM.K): Sandkraal *Adamson* 5014: *Garies Adamson*

4999, 5000, 5004: *Lewis* (SAM): Bitterfontien *Adamson* 4994: s.l. *Drege* 3025 (Z).

VAN RHYNSDORP. Foot of Van Rhyns Pass *Adamson* 4546: Karreeberg *Schlechter* 1224 (BM.Z), 3224 (G.K.S): Klaver *Adamson* 4533: *Lavis* (BOL.20243) (K): Zandkraal *Acocks* 14799 (PRE).

CLANWILLIAM. Pakhuis Pass *Adamson* 4517, 4524: *Godman* 562 (BM): Witte Els Kloof *Pillans* 9047 (BOL): Graafwater *Acocks* 3022 (S): Clanwilliam *Mader* 25 (K): Olifants Riv. *Pearson* 5254 (K).

PIKETBERG. Piketberg *Drege* (S).

MALMESBURY. Vredenburg *Leighton* 598 (BOL): Saldanha Bay *Galpin* 10725 (K): Mamre *Adamson* 4669.

WORCESTER. Worcester *Bolus* 5164 (K).

Without locality:—*Aiton* (G): *Drege* (*Ginginsia aurantia*) (BM), (*G. conferta*) (CGE.G.K.OXF.p.pte), (*C. microphylla*) (CGE.K): *Forsyth* (K): *Loddiges* (G): *Sweet* (CGE): *Thunberg* (S).

Var. **brachyphyllum** *Adamson* var. nov.

A typo differt caulibus brevibus ramosis, foliis brevibus teretibus subdistantibus planis vel revolutis, stipulis multo minoribus.

In small low tufts. Stems short, much branched. Leaves rather distant squarrose, 0.5—1 cm. long, flat or commonly revolute, rigid. Stipules about half as long as the leaves, very slightly sheathing at the base, with long fine hairs in the upper part. Stipular hairs straight or sometimes curled or even slightly woolly. Inflorescence and flowers as in the typical form. Stigmas mostly revolute.

The type is *Adamson* 5057 (BOL).

Dry rocky soils in the N.W. regions.

S.W. AFRICA. Schakalskuppe *Pearson* 4227 (K): Buchenberg *Dinter* 4461 (BM): Klinghardtberg *Dinter* 3977 (BM.BOL.K.PRE): Aus *Dinter* 6070 (PRE).

NAMAQUALAND. Viols Drift *Salter* 1439 (BM.K): Nieuwfontein *Pearson* 3351 (K): Kamiesberg *Adamson* 5057, 5066: Garies *Adamson* 5062: Wallekraal *Adamson* 5042.

PRIESKA. Prieska *Bryant* 600 (K).

CLANWILLIAM. Pakhuis *Levy's* 7229 (CT).

10. **P. dichotomum** L.f. Supp. Pl. 186. 1781.

Mollugo dichotoma Ser. in DC. Prodr. 1: 392. 1824.

Stems simple or branched, ranging from very short to 15 cm. long, erect or sprawling, woody only at the very base. Leaves alternate, crowded, with a tuft at the tip, less commonly in several dense whorls

on the stem, 0.5—3 cm. long, very narrow, rather rigid: hair-points 1—4 mm. long but soon deciduous leaving a short mucro. Stipules firm, opaque, white or yellowish, more or less closely sheathing at the base, at the top with rigid hairs 1—4 mm. long, the hairs as long as or longer than the sheathing part. Peduncles 3—8 cm. long, usually with a whorl of leaves at the top. Inflorescence branches repeatedly dichasial sometimes with 1 or more whorls of leaves, the ultimate pseudoracemose. Pedicels very slender, 1—2 cm. long. Perianth segments 2.5—3 mm. long. Disc white, of 3 obtuse very thin lobes. Stigmas short, white, revolute. Fruit rounded, as long as or slightly longer than the perianth. Seeds dark brown, finely granulate, discoid-biconvex, with a distinct rim.

The type is in herb. *Thunberg* (U).

Open places on sand, throughout the coastal belt and at the margins of the karroo.

Flowering 2—3 weeks later than the previous species. Very commonly red in the later stages. Very variable in size and habit. On exposed sites the stem is short and the leaves closely ascending, in shelter the stem is much longer and the leaves spreading and often in whorls. Plants from dry situations have longer more prominent stipules. While extreme forms look distinct there are all stages of intermediate. Seaside forms may have succulent leaves. In collections this has been much confused, especially with *P. elongatum*. This has been partly due to the fact that Fenzl in his monograph (Ann. Wien. Mus. 2: 154. 1840) and later Sonder (Fl. Cap. 1: 141. 1860) looked upon a short unbranched stem as diagnostic for the species. Examination of much material has shown that this is not so. The species is readily distinguished by the stipules and the seeds.

NAMAQUALAND. Silverfontein *Drege* (*Ginginsia barbata*) (K).

CLANWILLIAM. Krydouw *Adamson* 5228.

CERES. Leeuw Riv., Cold Bokkeveld *Adamson* 4705, 4710-1, 4715: Elands Kloof *Adamson* 4714, 4720, 5229-30-1: Baileys Gat *Adamson* 4721, 4725: Schurfteberg *Adamson* 4921-2: Michells Pass *Esterhuysen* 6190 (BOL): *Bolus* 5163 (K).

TULBAGH. Gt. Winterhoek *Ecklon* (Z): *Phillips* (BM).

WORCESTER. Louwshoek *Esterhuysen* 17653 (BOL): Orchard *Rogers* 16516 p.pt.e.(Z): Worcester *Rehmann* 2993 (Z): Goudini Baths *Adamson* 4407: Du Toits Kloof *Adamson* 4694-5.

PAARL. Witte Riv. *Adamson* 4743-4-5.

STELLENBOSCH. Jonkershoek *Adamson* 3982.

CAPE. Melkbosch *Adamson* 4679: Green Point *Burchell* 368A (K).

CALEDON. Caledon *Schlechter* 5608 (Z): Genadendal *Zeyher* (SAM): Sondereinde Mts. *Drege* (S): Sir Lowry Pass *Schlechter* 1120 (G.K.)

SWELLENDAM. Bonnievale *Acock* 1472 (S); Storms Vlei *Adamson* 4585; Swellendam *Zeyher* (SAM); Breede Riv. *Zeyher* 2499 (S); Appellkraal *Ecklon & Zeyher* 90.1 (S); Port Beaufort *Adamson* 4605.

MONTAGU. Wagonboomsberg *Adamson* 5098.

LADISMITH. Ladismith *Adamson* 4623; Seven Weeks Poort *Adamson* 4636.

HEIDELBERG. Heidelberg *Adamson* 4603.

OUDTSHOORN. Oudtshoorn *Rogers* 11272 (Z).

RIVERSDALE. Albertinia *Adamson* 4679; Riversdale *Schlechter* 1743 (Z).

MOSSSEL BAY. Gouritz Riv. *Burchell* 6492 (K); Mossel Bay *Rogers* 4214 (KZ).

GEORGE. Montagu Pass *Adamson* 5171, 5173, 5180.

UNIONDALE. Camfer *Adamson* 5181, 5183; Baviaans Kloof *Adamson* 5195.

KNYSNA. Belvedere *Duthie* 818 (BOL).

HUMANSDORP. Kouga Hills *Esterhuysen* 6666 (BOL); Assegai-bosch *Fourcade* 1423 (K).

UITENHAGE. Uitenhage *Alexander* (K); *Ecklon* (S); *Ecklon & Zeyher* 1821 (K); *Prior* (K); *Schlechter* 2483 (Z); Swartkops Riv. *Ecklon* 484 (G), s.n. (S); *Ecklon & Zeyher* 8 (SAM); *Pappe* (SAM); *Theron* 1069 (K.PRE); *Zeyher* 2494 (SAM), s.n. (S).

PT. ELIZABETH. Cape Recief *Ecklon & Zeyher* 93.7 (S); Walmer *Cruden* 315 (PRE); Witteklip *Rodin* 1027 (K.PRE); Redhouse *Paterson* 620 (G.Z).

ALEXANDRIA. Alexandria *Johnson* 926 (PRE); Kenkelbosch *Story* 2772 (PRE).

ALBANY. Grahamstown *MacOwan* 739 (BM.K); *F. S. Salisbury* (CGE); *Zeyher* 2495 (S.SAM); Coerney Riv. *Johnson* 744 (PRE); Southwell *Acocks* 16119 (K.PRE); Kasauga Riv. *Britten* 2423 (PRE); Port Alfred *Tyson* 163 (PRE).

SOMERSET EAST. Quaggas Vlake *Ecklon* (S); *Ecklon & Zeyher* 1820 (G.K.OXF).

GRAAFF-REINET. Zuurpoort *Bolus* 533 (K).

RICHMOND. Vlakplaats *Bolus* 13858 (BOL).

XALANGA. Cala *Flanagan* 2631 (PRE).

TRANSVAAL. Johannesburg *Gilfillan* 1439 (PRE) ? not native.

Without locality:—*Boivin* (K); *Burt-Davy* 11672, 11885 (PRE); *Drege* (*Ginginsia barbata*) (K), (*G. microphylla* (K.p.pt.), (*G. prolifera*) (G); *Ecklon & Zeyher* 2.10 (Z), 2498 (Z), s.n. (CGE); *Krebs* 22 (G); *Perdonnet* 23 (Z); *Verreaux* (G).

11. *P. fluviatile* Ecklon & Zeyher Enum. 266. 1837.

P. patens E. & Z. l.c. 285. p.ptc.

P. dichotomum var. *lineare* Fenzl Ann. Wien. Mus. 2: 154. 1840.

Perennial, with a short stem with tufted leaves and 5—15 prostrate annual branches with whorled leaves. Stems and leaves often red. Annual branches 10—25 cm. long, with internodes 3—12 cm. long. Basal leaves crowded, persistent but in young plants withering about flowering time, linear, flat, about 2 cm. long, 1.5—2 mm. wide, not narrowed to the base but slightly widened to the tip. Stem leaves shorter and narrower, 1—2 cm. long, often revolute. Stipules white, opaque, not sheathing, 2—3 cm. long and about as wide, entire at the base but in the upper part cut into narrow lobes or coarse hairs. Stipules on the stems often forming a distinct bulge below the leaves. Inflorescences terminal and lateral, spreading, forking 1—3 times, the ultimate branches pseudoracemose. Peduncles slender, 1—3 cm. long. Pedicels 0.4—1 cm. long. Perianth segments about 3 mm. long, distinctly connate at the base. Disc white, of 3 broad obtuse lobes. Stigmas thick, white. Fruit rounded, slightly longer than the perianth. Seeds dark brown, very finely granular, flattened-biconvex, with a distinct border.

The type is *Ecklon & Zeyher* 1828 (B), lectotype (S).

Sand or gravel at low altitudes on the southern coastal belt.

The flowers open about 4 p.m. While generally perennial, plants on sand may flower in the first year and may behave as annuals. Rather variable in size and in the degree of cutting of the stipules. Those of the outer basal leaves may be almost entire, of the inner lacerate with the lobes not longer than the basal part. Stipules on the stems have the hairs longer. Plants with very long hairs to the stipules constitute *P. dichotomum* var. *barbatum* Fenzl l.c. but there are all stages of intermediate.

This species is allied to *P. dichotomum* but distinguished by the habit, the broader flatter leaves, the not sheathing stipules, and the less spreading inflorescence. It has some resemblance to *P. Thunbergii* but is separated by the basal leaf-tuft, the leaves not narrowed to the base, the larger stipules, and the inflorescences. The plants distributed by Ecklon & Zeyher under the name *P. patens* are largely this species.

TULBAGH. Gt. Winterhoek *Phillips* 1754 (SAM).

CALEDON. Pringle Bay *Adamson* 4940: Caledon *Rogers* 29032 (SAM).

ROBERTSON. Robertson *Adamson* 5157.

SWELLENDAM. Port Beaufort *Adamson* 3821, 4615.

RIVERSDALE. Albertinia *Muir* 107 (PRE): Gouritz Riv. mouth *Adamson* 4864, 4866.

KNYSNA. Keurbooms Riv. *Drege* (S).

UITENHAGE. Swartkops Riv. *Ecklon* 30, s.n. (S): 1046 (BOL.G.S): *Ecklon & Zeyher* 1828 (BOL.OXF.S.SAM): *Zeyher* 484 (K.SAM): Kaffir Drift *Burchell* 3684 (K).

ALBANY. Grahamstown *Bowker* (K): *Zeyher* 2495 (S.SAM).

SOMERSET EAST. Quaggas Vlakte *Ecklon* (S): *Ecklon & Zeyher* 1820 (S.SAM).

Without locality:—*Burmenn* (G): *Drege* (*Ginginsia barbata*) (G.K), (*P. dichotomum* var. *barbatum*) (S): *Ecklon* (S): *Ecklon & Zeyher* 2493 (K.Z).

12. **P. trigonum** *Ecklon & Zeyher* Enum. 286. 1837.

Low-growing in darkish green patches. Stems woody, prostrate, much branched, either in or just above the ground, with many short erect leafy branches 1—2 cm. high. Leaves crowded, more or less squarrose, 0.5—0.8 cm. long, dark green, rigid, trigonous, hair-pointed. Stipules inconspicuous, opaque, often yellowish, sheathing, with a fringe of distant coarse hairs 1 mm. long at the top, the hairs straight, shorter than the sheathing part, sometimes only 1 or 2. Inflorescences slender, forking, with pseudoracemose branches. Peduncle 2—6 cm. long. Pedicels slender, 0.5—1 cm. long. Perianth segments 3—3.5 mm. long, green outside, greenish white inside. Anthers rotund-oblong. Disc of 3 broad crenulated lobes. Stigmas short, thick, less than 1 mm. long. Fruit rounded, very slightly longer than the perianth. Seeds shining, subglobose, distinctly bordered.

The type is *Zeyher* (Coega) (B), lectotype *Ecklon & Zeyher* 1831 (S).

Dry sandy or rocky slopes, especially in the S.E. Cape.

The flowers open in the late afternoon.

WORCESTER. Matroosberg *Levy* 392 (CT).

SWELLENDAM. Bonnievale *Acocks* 1933 (S).

RIVERSDALE. Gouritz Riv. bridge *Story* 2824 (PRE): do. mouth *Adamson* 4855, 4859.

MOSSEL BAY. Hartenbosch *Burchell* 6209 (K).

KNYSNA. Knysna *Bolus* 533 (BOL).

UNIONDALE. Uniondale *Fourcade* 1664 (K): *Avontuur Fourcade* 1664 (BOL.PRE).

HUMANSDORP. Combrink *Acocks* 13608 (PRE): Baviaans Kloof *Adamson* 5201.

UITENHAGE. Enon *Thode* A2664 (K.PRE): *Uitenhage Prior* (K): *Thode* A655 (K.PRE): Swartkops Riv. *Theron* (K): Coega *Ecklon & Zeyher* 1831 (S.SAM): *Addo Fries, Norlindh & Weimarck* (BOL).

SOMERSET EAST. Somerset East *MacOwan* (G).

ALEXANDRIA. Alexandria *Galpin* (BOL).

ALBANY. Bothas Hill *Dyer* 1464 (PRE): Table Farm *Adamson* 4765: Fish Riv. *Adamson* 5266: Committees Drift *Dyer* 1540 (K.PRE): Harben *Schonland* 3082 (PRE): Port Alfred *Tyson* 163 (PRE).

KINGWILLIAMSTOWN. Keiskamahoe *Schlechter* 6116 (Z).

GRAAF-FREINET. Paarde Poort *Adamson* 5203: Andriesberg *Schlechter* 2210 (BM).

MIDDELBURG. Middelburg *Sidey* 501 (PRE): Bangor Farm *Bolus* 14053 (BOL): Sneeuwberg *Acocks* 16515 (PRE).

CRADOCK. Jakalsfontein *Acocks* 17507 (PRE).

HAY. Asbestos Mts. *Burchell* 1666 (K).

BEAUFORT WEST. Bulwater *Acocks* 14179 (PRE).

ROUXVILLE. Caledon Riv. *Zeyher* 114.10 (S).

TRANSVAAL. Paul Roux *Acocks* 13182 (PRE).

BASUTOLAND. Mafeteng *Gerstner* 231 (PRE).

"EASTERN PROVINCE" *Prior* (Z).

Without locality:—*Drege* (*P. dichotomum* var. *filifolia*) (S). (*P. incanum*) (G); *Ecklon & Zeyher* 2494 (Z).

13. ***P. detonsum*** Fenzl Ann. Wien. Mus. 2: 253. 1840.

P. patens Ecklon & Zeyher Enum. 285. 1837. p.pt.

In small tufts. Stems 1—5 cm. long, woody, branched, suberect. Leaves ascending, 1—1.5 cm. long, slender, revolute-rolled, hair-pointed. Stipules loosely sheathing, entire but with 1 or occasionally 2 lateral tooth-like projections, slightly adnate to the leaf-base. Peduncles 4—6 cm. long, with 1 or 2 leaves and stipules at the top. Inflorescence umbel-like. Pedicels slender, 0.5—1 cm. long. Perianth segments 3.5—4 mm. long, often yellowish inside and at the edges. Disc of 3 broad obtuse crenulate lobes. Stigmas broad, revolute. Fruit as long as the perianth. Seeds shining, subglobose.

The type is *Drege* 6223 (W), lectotype *Drege* (Klipplaat Riv.) (S).

Open sandy or rocky places in the drier regions. Rare but widespread. Not much collected.

Like *P. trigonum* but with longer ascending leaves and quite different stipules. In collections there has been much confusion and the name has been attached to examples of various species. The confusion has been such that Schinz (Mem. Herb. Boiss. 20: 17. 1900) suggested that the name be dropped as indeterminate. It would appear from the specimens he quotes that he had not seen the type.

VAN RHYNSDORP. Top of Van Rhyns Pass *Adamson* 4547.

PORT BEAUFORT. Kat Riv. *Ecklon* (S).

SOMERSET EAST. Boschberg *MacOwan* 739 (K).

COLESBERG. Naaupoort *Rogers* 15406 (Z).

GRAAFF-REINET. Sneeuwberg *Bolus* 533 (K).

CRADOCK. Zwagenhoek *Acocks* 15710 (PRE).

QUEENSTOWN. Klipplaat Riv. *Drege* (S.Z).

BASUTOLAND. Mamethes *Guillarmod* 906 (PRE): Mokhotlong *Guillarmod* 1031, 1168 (PRE): s.l. *Page* (PRE).

Without locality:—*Drege* (*Ginginsia albens* (G.K): *Masson* (BM): *Thunberg* (S).

14. **P. ciliare** Adamson sp. nov.

P. trigono affinis sed differt caulibus laxe caespitosis, foliis ascendentibus haud squarrosis decidue aristatis, stipulis marginibus longe ciliatis, inflorescentia multiflora ramis pedicellisque ascendentibus.

In lax tufts with short woody more or less erect stems with branches 2—5 cm. long. Leaves slender, usually ascending, 0.5—1 cm. long, not crowded, with deciduous hair-points. Stipules 2—3 mm. long, white or brownish, partly adnate to the leaf-base, the edges ciliate with long but not dense hairs, the hairs 1.5 mm. long, straight or crisped. Peduncles 6—9 cm. long, often purple, with a whorl of small leaves at the top. Inflorescence many-flowered, with slender ascending branches 2 or 3-times dichasial. Pedicels 1—1.5 cm. long. Perianth segments 3—3.5 mm. long. Anthers white, short. Disc white, of 3 broad thin truncate or emarginate lobes. Stigmas white, flat, broad. Fruit rounded, slightly longer than the perianth. Seeds dark brown, shining but minutely rugose, compressed, with a broad flat border.

The type is *Adamson* 5128 (BOL).

Rocky places in the Little Karroo.

Allied to *P. trigonum* but distinguished by the lax suberect habit, the longer ascending leaves, the quite different stipules, the larger flowers and the flat stigmas.

HEIDELBERG. E. of Lemoenshoek *Adamson* 5138.

LADISMITH. E. side of Warmwaterberg *Adamson* 5128.

MONTAGU. Kiesies Doorns *Tredgold* 443 (PRE).

15. **P. alpinum** Adamson sp. nov.

Caespitosa. Folia radicalia numerosa congesta, stipulis minutis caducis integris vel denticulatis. Folia caulina parva verticillata. Inflorescentia pauciflora. Segmenta perigonii obtusa basi connata. Squamulae latae obtusae. Capsula rotundata perigonio longior.

In small dense tufts, solitary or few together. Leaves in a compact basal rosette, numerous, erect, flat, 1—3 cm. long, 2—3 mm. wide, slightly

widened towards the tip, sheathing at the base. Stipules caducous, very small, 1—1.5 mm. long, entire or toothed at the sides, those of the cauline leaves longer with 1—2 projecting lateral teeth. Peduncle 2—4 cm. long, with 1—2 partial whorls of leaves. Inflorescence forking below, pseudoracemose above: flowers few. Perianth segments 3—3.5 mm. long, distinctly connate at the base. Disc of 3 broad obtuse lobes, white. Stigmas small, cylindrical, reflexed. Fruit rounded, distinctly longer than the perianth. Seeds few, black, shining, bordered.

The type is *Galpin* 6632 (K).

Among rocks on the summits of the southern Drakensberg. In habit like a species of *Psammotropha* but not in the inflorescence.

BARCLY EAST. Ben Macdhui *Galpin* 6633 (K): Doodmanskrantz *Galpin* 6632 (K).

16. **P. brevicaule** (DC) Bartl. *Linnaea* 7: 625. 1832.

Ginginsia brevicaulis DC. *Mem. Soc. Hist. Nat. Paris* 4: 187. t.17. 1828.

P. Zeyheri Sond. *Fl. Cap.* 1: 141. 1860.

P. merxmülleri Friedrich Mitt. *Bot. Munch.* 12: 64. 1955.

Low-growing, with 1 or several tufts of leaves on or near the ground. Stems woody, less than 5 cm. long above ground level, often covered by persistent stipules. Leaves crowded, 1—3 cm. long, linear, flat, sometimes with a thickened border, the hair-points deciduous. Stipules white or yellowish, often undulate, opaque, 1—4 mm. long, entire but with coarse hairs at the top. Stipules persistent after leaf-fall and surrounding the leaf tuft and often covering the lower part of the stem. Inflorescences many, slender, with 3 (2—5) branches at the nodes, the ultimate pseudoracemose. Peduncle 5—8 cm. long, usually with a whorl of small leaves at the top, rarely with further whorls at the nodes. Pedicels capillary, 0.5—1.5 cm. long, ascending. Perianth segments about 3 mm. long, with a broad white margin. Disc of 5 white or pink acute or subacute lobes. Stigmas short, pink. Fruit as long as the perianth. Seeds shining, subglobose.

The type is *Burchell* 2259 (G).

Dry rocky places in the northern parts, especially in the grassveld region.

Very distinctive in the large persistent stipules enclosing the leaf tuft and often clothing the stem. Rather variable in the length and width of the leaves, from filiform to 2 mm. wide. Leaves often slightly widened to the tip. The name has been often misapplied (e.g. *J. S. Af. Bot.* 8: 273. 1942) but there is no doubt that the type specimen is conspecific

with *Zeyher* 614, the type of *P. Zeyheri* Sond. *P. merxmuelleri* is a form with very narrow leaves and persistent stipules on the stem, but not otherwise separable.

S.W. AFRICA. Okahandja *Dinter* 4180 (PRE); Kobus *Dinter* 8352 (G.K.Z); Friedendal *Dinter* 7988 (K); Kl. Karas *Dinter* 4866 (PRE), 5033 (G.PRE).

KIMBERLEY. Riverton *Moran* (K).

VRYBURG. Litakun *Burchell* 2259 (G).

HEILBRON. Vaal Riv. *Flanagan* 1448 (PRE).

BOTHAVILLE. Bothaville *Goosens* 1226 (PRE).

HARRISMITH. Harrismith *Sankey* 248 (K); Witzieshoek *Flanagan* 1929 (PRE).

FOURIESBURG. Dunelm Fm. *Potts* 3039 (PRE).

FICKSBURG. Ficksburg *Stockdale* (BM).

BETHLEHEM. Bethlehem *Phillips* 3208 (PRE); *Potgieter* 25 (PRE).

RUSTENBURG. Magaliesberg *Burke* (K); *Zeyher* 614 (BM.CGE.S).

PIETERSBURG. Pietersburg *Acock & Hafstrom* 431 (S) *Junod* 511 (Z). Nazareth *Schlechter* 4481 (BM.BOL.G.K.S.Z); Kl. Olifants Riv. *Schlechter* 4020 (BM.G.K.S.Z).

WOLMARANSSTAD. Leeuwdoorns *Hyde* (PRE).

BASUTOLAND. Leribe *Dieterlen* 6875 (K), 617 (K).

S. RHODESIA. Matopos *L. Gibbs* 45 (BM.BOL); Matabeleland *Baines* (K).

Without locality:—*Drege* (*Ginginsia brevicaulis*) (G.K.); *Lehmann* (K); *Wahlberg* (S).

17. *P. croceum* E. Mey. ex Fenzl Ann. Wien. Mus. 2: 255. 1840.

Annual or perennial herb with a tuft of leaves from a tap root. Leaves dark green or brownish, 1—5 cm. long, linear, flat or rolled, often semi-cylindrical and more or less succulent, slightly sheathing at the base. Stipules mostly wanting on the outer leaves, on the inner 3—5 mm. long, narrow, acute, cut in the upper part into rather distant narrow lobes or hairs. Inflorescence erect. Peduncles rather stout, 4—10 cm. long, usually with a whorl of leaves at the top. Stipules at the inflorescence nodes more lacerate, with many hairs. Inflorescence dichasial, the branches again dichasial or pseudoracemose. Pedicels slender, 1—2 cm. long, not deflexed. Perianth segments 3—4 mm. long, pink yellow or red inside, reflexed at anthesis. Disc rather large, or 3 truncate usually orange lobes. Stigmas thick, cylindrical, bright orange. Fruit rounded, about as long as the perianth.

The type is *Drege* 7065 (W), lectotype (S).

Open places where moisture collects in the N.W. Cape.

Flowers opening in the early afternoon, rarely white. Variable in the length and thickness of the leaves. Fenzl (l.c.) described two varieties, a) *crassifolia* with relatively wide leaves, and b) *tenuifolia* with narrow leaves, but there are all stages of intermediate between the two. The plants distributed by Schlechter (11232) under the MS name "*P. glaucophyllum*", only differ in having very numerous leaves, more cut stipules, and very slender inflorescences.

S.W. AFRICA. Hahlenberg *Dinter* 4074 (K.PRE).

NAMAQUALAND. Port Nolloth *Bolus* 9524 (K); Iaus *Schlechter* 11232 (BM.G.K.Z); Garies *Salter* 3693 (BOL); s.l. *Scully* (BM.K).

CALVINIA. *Calvinia Leistner* 302 (PRE); Middelpost *Acocks* 17704 (PRE).

SUTHERLAND. Rd. to Middelpost *Hutchinson* 715 (BOL.K).

CLANWILLIAM. Zout Riv. *Schlechter* 8137 (BM.BOL.G.K.S.Z).

CERES. Cold Bokkeveld *Esterhuysen* 3478 (BOL).

HAY. Langeberg *Acocks* 502 (PRE).

CAPE. Simonstown *Schlechter* 332 (BM.BOL.CGE.Z).

Without locality:—*Drege* (*Ginginsia crocea*) (BM.G.CGE.K.OXF) (*P. croceum*) (S), s.n. (G).

N.B. There is doubt about the correctness of the locality for the Cape record. The species has not been seen there otherwise.

18. **P. gracile** Fenzl Ann. Wien. Mus. 2: 256. 1840.

An erect annual with a tap root. Basal leaves crowded, ascending, very narrow, 1—1.5 cm. long, with hair-points 3—5 mm. long. Stipules elongate-triangular, 4—5 mm. long, entire or cut into a few narrow lobes or hairs. Peduncles rigid, slender, 5—6 cm. high, with a whorl of small leaves at the top. Inflorescence trichotomous, the branches dichasial. Pedicels capillary, 0.5—1.5 cm. long. Perianth segments about 2 mm. long. Disc white, very small. Fruit slightly longer than the perianth.

The type is *Drege* 652 (W).

Dry regions, apparently rare and very seldom collected.

S.W. AFRICA. Karibib *Kinges* 3396 (PRE).

LAINSBURG. Dwyka Riv. *Drege* (S).

19. **P. subtile** E. Mey. ex Fenzl Ann. Wien. Mus. 2: 259. 1840.

Annual with flowering stems 3—8 cm. high. Basal leaves in a loose rosette, the outer oblong, 0.5—0.8 cm. long, 2—2.5 mm. wide, obtuse, narrowed at the base to a petiole, the inner linear or linear-oblong 0.6—1

cm. long, not petiolate. Stem leaves 1—4, in a whorl, linear, about 1 mm. wide. Stipules minute, more or less entire, caducous except on the inflorescence. Flowering stems with 1 or rarely 2 whorls of leaves. Peduncles 2—3.5 cm. long. Inflorescence dichasial at the base, the branches pseudoracemose. Pedicels 0.3—0.6 cm. long, deflexed at the fruiting stage. Perianth segments 1—1.5 mm. long. Disc 3-lobed, very thin and soon withering. Fruit spherical, as long as the perianth. Seeds small, globose-biconvex, dark brown, finely granulate-rugose.

The type is *Drege* 6214 (B).

Open spaces. Apparently rare.

The type specimen has not been seen but those quoted agree with the full description by Fenzl (l.c.).

LITTLE KARROO. Bonnievale *Acocks* (S): Berg Valley Riv. *Acocks* 2189 (S). There is a specimen (S) of the same plant without collector's name or locality which is labelled "*P. subtile* E.M. *lusus* 1".

20. *P. exiguum* Adamson sp. nov.

P. brevicaule auct. non (DC) Bartl. (Adamson J. S. Af. Bot. 8: 273. 1942).

Annua. Folia omnia linearia radicalia comosa caulina verticillata. Stipulae lacerae. Flores parvi. Squamae hypogynae tres pallidae marcescentes. Capsula perigonio longior. Semina laevia nitida.

Annual with a basal tuft of leaves and 1—6 sprawling flowering stems, 3—30 cm. long, with whorls of leaves. Basal leaves linear-filiform, flat, 0.5—5 cm. long, with deciduous hair-points. Stem leaves similar but shorter. Stipules 1 mm. long, acute, irregularly lacerate, persistent or sometimes deciduous on the older leaves. Inflorescence with 2—3 branches at the nodes, the ultimate very slender. Pedicels 0.5—2 cm. long, spreading but deflexed at the fruiting stage. Perianth segments green 1.5—2 mm. long. Disc white or pink, 3-lobed, the lobes very thin, crenulate, soon withering away. Stigmas short. Fruit rounded ovoid, distinctly longer than the perianth. Seeds dark brown, discoid-biconvex, smooth, shining, with a distinct border.

The type is *Adamson* 4566 (BOL).

Frequent on open sand at low altitudes in the western districts.

This has been much confused with *P. subtile* Fenzl and specimens are usually so named. It differs in having all the basal leaves linear, in the persistent lacerate stipules, the fruit distinctly longer than the perianth, and in the smooth shining seeds. It was misnamed *P. brevicaule* in Fl. Cap. Pen. 316. 1950.

NAMAQUALAND. Garies *Adamson* 5003: Wallekraal *Adamson* 4997, 5029, 5031.

CLANWILLIAM. Lamberts Bay *Adamson* 4509, 4510: Graafwater *Adamson* 4480: Clanwilliam *Schlechter* 2423 (Z), 5062 (BM.G.K.S.Z): 8423 (BM.G.K.S.Z): Barrage *Adamson* 4958.

VAN RHYNSDORP. Kareeberg *Schlechter* 8297 (BM.K.Z): Zandkraal *Acocks* 14803 (PRE).

CERES. Karroo Poort *Adamson* 4735: Theronberg *Adamson* 2986.

MALMESBURY. Mamre 4670.

STELLENBOSCH. Brakenfel *Acock* 2126 (S): Sir Lowry Pass *Hafstrom* (S).

CAPE. Robben Is. *Wilms* 3234 (BM.G.K): Swartklip *Adamson* 4571: Blaauwberg *Adamson* 4565-6-7: Rugby *Adamson* 2920: Paarden Is. *Salter* 8282 (BOL): *Wolley-Dod* 3184, 3376 (K): Green Point *Ecklon & Zeyher* 1819 (S.SAM): Hout Bay *Adamson* 3197: Raapenburg *Guthrie* 847 (CT): Kalk Bay *Zeyher* (SAM): Simonstown *Schlechter* 1202 (BM.BOL.G.K.SAM.Z): Fishhoek *Levyys* (CT): Oatlands Pt. *Wolley-Dod* 2907 (BOL.K), 2774 (K): Paulsberg *Wolley-Dod* 2868, 2905 (K).

21. **P. Thunbergii** *Adamson* J. S. Afr. Bot. 8: 273. 1942.

P. distichum Thunb. Hoffm. Phyt. Blaet. 1: 60. 1803 *non* L. Mant. 2: 221. 1771.

Glabrous, prostrate or sprawling. Stems many, up to 60 cm. long, branched especially in the upper parts, very slightly woody at the base, with internodes 1.5—5 cm. long. Leaves in whorls of 6—8, oblong or narrowly obovate, 1.5—2.5 cm. long, 0.5—0.7 cm. wide, acute, distinctly narrowed to the base but not petiolate, thin, the midrib clearly visible below. Stipules 2 mm. long and about as wide, cut into narrow strips or coarse threads. Inflorescences axillary, ascending, with 3—8 flowers. Peduncles slender, 2—3 cm. long. Inflorescence branches 1 or 2, zigzag, pseudoracemose. Pedicels slender, 0.4—0.6 cm. long. Perianth segments 3—4 mm. long. Disc small, of 5 obtuse usually white lobes. Stigmas short, stout. Fruit rounded, slightly shorter than the perianth. Seeds black, shining, with a distinct border.

The type is in herb. *Thunberg* (U).

Bushy places especially near the coast in the south-eastern and eastern coastal belts.

Flowers greenish, opening in mid afternoon. Without persistent basal leaves.

KNYSNA. Knysna *Zeyher* (SAM): Ruigte Vlei *Fourcade* 1554 (BOL).

HUMANSDORP. Klipdrift Riv. *Fourcade* 1871 (K): Krakakama *Burchell* 4552 (K): *Ecklon & Zeyher* 1829 (OXF.S.SAM), 2494 (S.SAM).

PORT ELIZABETH. Baakens Valley *Tyson* 1871 (K): Humewood *Paterson* 787 (PRE.Z).

ALBANY. Port Alfred *F. S. Salisbury* (BM.Z): *Tyson* 168 (PRE): Kowie West *Britten* 688 (PRE): *Tyson* (BOL): Fish Riv. *Burchell* 3720 (K).

EAST LONDON. East London *Comins* 1040 (PRE).

KOMGHA. Kei Mouth *Flanagan* 84 (PRE.SAM).

KENTANI. Kentani *Pegler* 2019 (BOL.PRE): Mazeppa Bay *Acocks* 13597 (PRE): *Thevon* 1223 (K.PRE).

WILLOWVALE. Coffee Bay *Tyson* 7 (PRE). s.n. (BM.G.K.Z).

PORT ST. JOHNS. Port St. Johns *Wager* (PRE).

NATAL. Amanzimtoti *Wood* 12686 (K.Z): Koussie *Drege* (S): Umkomaas *Drege* (S): Isipingo *Moss* 2454 (BM): Durban Bluff *Wood* 5480 (BM.BOL.SAM): s.l. *Drege* 6215 (Z).

Without locality:—*Drege* (*Mollugo dichotoma*) (BM.G.K.OXF), (*M. multiflora*) (BM.CGE.G.K.): "Hort. Petrop." (K).

22. ***P. cordifolium*** L. Pl. Rar. Afr. 9: Amoën. Acad. 6: 85. 1760.

P. obovatum Bolus J. Linn. Soc. Bot. 35: 162. 1889.

P. cordifolium var. *obovatum* Bolus & Wolley-Dod Trans. S. Afr. Phil. Soc. 5: 271. 1903.

A glabrous prostrate perennial with many branching stems up to 50 cm. long from a woody rootstock. Internodes 1.5–5 cm. long. Leaves in whorls of 6, leathery or almost succulent, obovate subrotund or elliptical, obtuse retuse or subacute at the tip, narrowed to the base and the lower almost petiolate. Leaves often brownish or yellowish, green in shade, usually with the veins not visible. Stipules 1 mm. long, 1–2 mm. wide, lacerate with short acute teeth but no hairs. Inflorescence axillary, much longer than the leaves, usually forking. Peduncle 1–3 cm. long. Flowers rather numerous, pseudoracemose on the branches. Pedicels 0.4–0.5 cm. long. Perianth segments 3–4 mm. long. Disc pink, of 3 broad flat crenulated lobes. Fruit rounded, very slightly longer than the perianth. Seeds black, shining.

The type is in herb. *Linn.* (387:6), of *P. obovatum* Bolus 622 (BOL). Sand-dunes in the S.W. Cape.

Variable in size and in leaf-form. In open sites the leaves are broad, short and usually obtuse, in shade they are longer and more acute. Shade forms closely resemble *P. Thunbergii* but are distinguished by the thicker

leaves without visible veins, by the smaller and less cut stipules, by the forked inflorescence, and by the larger fruit.

STELLENBOSCH. Faure *Acocks* 2510 (S).

'CAPE. Swartklip *Pillans* 9232 (BOL): Strandfontein *Acocks* 682 (S): *Adamson* 4739: Salt River *Marloth* (Z): False Bay *Bolus* 622 (BM.BOL. G.K.SAM): Muizenberg *Bolus* 4830 (BOL): *Kensit* (CT): *Michell* (CT): *Moss* 7028 (BM): *Normand* (CT): Kalk Bay *Prior* (K): *Zeyher* (SAM): Glencairn *Hutchinson* 637 (BOL.K): Simonstown *Salter* 271/13 (BM): *Schlechter* 1205 (BM.G.K.S.Z): *Wolley-Dod* 2014 (K): *Wright* (K): Oatlands Point *Wolley-Dod* 2852 (BM): Buffels Bay *Salter* 271/10 (BM), 1844 (CT.): Cape Point *Godman* 860 (BM): Cape Maclear *Salter* 1806 BM.BOL.K).

CALEDON. Mossel Riv. *L. Guthrie* (PRE).

Without locality:—*Harvey* 243 (K), 611 (K), s.n. (BM): *Masson* (BM): *E. P. Phillips* (PRE).

23. ***P. serpyllifolium*** L.f. Supp. Pl. 183. 1781.

Mollugo serpyllifolia Ser. in DC. Prodr. 1: 391. 1824.

A small slender much branched herb forming low tangles. Stems more or less prostrate, 3—5 cm. long. Leaves basal and in whorls of 2—3 along the stem, usually opposite on the flowering shoots. Basal leaves ovate or oblong, 2—6 mm. long, 1—3 mm. wide, obtuse, narrowed at the base to a petiole 1—2 mm. long. Stem leaves similar but smaller and with a shorter petiole. Stipules about as long as the petioles, completely cut into coarse straight hairs or rigid bristles. Inflorescences terminal and axillary, with few, 1—3 or rarely 5, flowers. Peduncles 3—5 mm. long. Pedicels 5—8 mm. Perianth segments about 1.5 mm. long, greenish-white. Disc very small, 5-lobed, soon withering away. Fruit spherical, as long as the perianth. Seeds 2—3, brown, compressed, finely punctulate, with a thickened border.

The type is in herb. *Thunberg* (U).

Rock crevices on the upper parts of the Cedarberg and associated ranges.

Described as an annual but undoubtedly perennating.

CLANWILLIAM. Koupoort *Esterhuysen* 12172 (BOL): Wolfberg *Esterhuysen* 18179 (BOL): Langeberg *Esterhuysen* 7309 (BOL.K): Sneeu-kop *Wallick* (S): Tafelberg *Barnard* (SAM): *Esterhuysen* 14334 (BOL): Cedarberg *Drege* 3022b (Z): Uitkyk Pass *Acock* 3098 (S): *Leighton* (BOL).

CERES. Olifants Riv. Mts. *Esterhuysen* 15144 (BOL): Gydoberg *Schlechter* 10226 (BM.G.K.S.Z).

Without locality:—*Burmman* (G): *Drege* (*Mallogonum serpyllifolium*) (BM.CGE.G.K.S): *Masson* (BM): *Montini* (S): *Swartz* (S): *Thunberg* (S): *Wallich* (S).

Section 2. **Spergulopsis** Adamson sect. nov.

A sectione Pharnaceo differt squamulis hypogynis nullis. Folia linearia verticillata. Flores magni.

Like Sect. Pharnaceum but with no disc below the ovary. Large plants with linear leaves in whorls along the stem.

Only species *P. lineare* L.f.

In the absence of the disc in the flower this section approaches the genus *Mollugo* but differs in habit, persistent stipules, large flowers, thick cylindrical stigmas, and orbicular seeds.

24. **P. lineare** L.f. Supp. Pl. 183. 1781.

Mollugo linearis Ser. in DC. Prodr. 1: 392. 1824.

Glabrous, prostrate or sprawling. Stems dark green, several from a woody rootstock, up to 1 m. long, branching in the upper parts: internodes 3—12 cm. long. Leaves in whorls usually of 6, linear, 2—5 cm. long, 1—3 mm. wide, flat or revolute, dark green. Stipules about 1 mm. long and as wide or wider, acute, cut at the top into lobes ending in short hairs, deciduous on the older leaves. Peduncles axillary, up to 6 cm. long, with or without a whorl of leaves at the top. Inflorescence branches dichasial, 5—10 cm. long, more or less secund, zigzag and pseudoracemose. Pedicels 1—1.5 cm. long, deflexed at the fruiting stage. Flowers opening quite flat. Perianth segments 5—8 mm. long, narrow-oblong, separate in the open flower, red or brown outside, white or pale pink inside. Stigmas thick, cylindrical. Fruit ellipsoid, rather narrow, as long as or longer than the perianth. Seeds black, shining, with a distinct rim.

The type is in herb. *Thunberg* (U).

Sandy flats, usually among bushes, on the western and south-western coastal belts.

The flowers open about midday. A distinctive species easily recognised by the habit, linear whorled leaves, and large flowers. In dry situations the stems may be short with only 1—2 internodes.

NAMAQUALAND. Droogt Riv. *Schlechter* 8321 (BM.G.K.Z).

CLANWILLIAM. Clanwilliam *Zeyher* 623 (CGE).

CERES. Verloren Vlei *Pillans* 7974 (BOL).

PIKETBERG. 24 Rivers *Zeyher* 623 (BM.BOL.G.K.S.Z).

STELLENBOSCH. Kuils Riv. *Garside* 139 (K); *Salter* 4921 (BM.BOL.K); *Worsdell* (K); Bottelary R. *Acock* 976 (S); foot of Sir Lowry Pass *Hafstrom* (S); Hottentots Holland *Verreaux* (G).

CAPE. Melkbosch *Hafstrom* (S); Riet Vlei *Pappe* (SAM); *Wolley-Dod* 3261 (BM.BOL.K); Vygeskraal *Wolley-Dod* 252 (BOL.K); Milnerton *Hafstrom* (S); Tygerberg *Ecklon* (S); *Ecklon & Zeyher* 1827 (OXF.S);

Moss 9059 (BM): *Prior* (K): Cape Flats *Bowker* (K): *Burchell* (Z): *Burke* (K): *Rehmann* 2199 (BM.Z): *Zeyher* (SAM): Zeekoe Vlei *Salter* 271 7 (BM): Cape Town *Alexander* (K): *Bolus* 3284 (BM.BOL.K): *de Vylder* (S): Hout Bay *Alexander* (K): *Salter* 1733 (K): Raapenburg *Guthrie* 39 (CT): Wynberg *L. Bolus* (CT): Diep Riv. *O. Kuntze* (K): *Salter* 1733 (K): Retreat *Schlechter* 648 (Z): *Steenberg Adamson* 5224: Lakeside *Moss & Rogers* 1634 (Z): False Bay *Schlechter* 454 (Z).

CALEDON. Genadendal *Alexander* (BM).

BREDASDROP. Cape Agulhas *Esterhuysen* 4423 (BOL).

Without locality:—*Alexander* (PRE): *Bowie* (BM): *Burke & Zeyher* 623 (OXF): *Burmah* (G): *Drege* (S.Z): (*Ginginsia effnoa*) (K): *Goodenough* (K): *Harvey* (BM), 220 (K): *Oldenburg* 1161 (BM): *Pappe* (K): *Thunberg* (S): *Zeyher* 625 (K.PRE).

Section 3. ***Suessenguthiella*** Adamson comb. nov.

Friedrich Mitt. Bot. Munch. 12: 60. 1955 (*pro gen.*).

Annuals. Leaves in whorls. Inflorescence few-flowered, not longer than the leaves. Perianth segments with a horn-like projection behind the tip.

Only species *P. scleranthoides* Sond.

25. ***P. scleranthoides*** Sond. Fl. Cap. 1: 143. 1860.

Suessenguthiella scleranthoides Friedrich Mitt. Bot. Munch. 12: 60. 1955.

A prostrate many-stemmed annual with a tap root. Stems up to 25 cm. long, with leaves in whorls separated by internodes 0.5—1 cm. long. Leaves 6 in a whorl, ascending or appressed, revolute or rolled, 0.4—0.7 cm. long, rather rigid, with a hair-point 1—3 mm. long. Stipules 2—4 mm. long, white, entire at the base, in the upper part palmately divided into rather rigid lobes or stout hairs. Flowers in axillary groups of 3, rarely 1, 2 or 5, shorter than the leaves. Pedicels 0.5—2 mm. long. Perianth segments about 3 mm. long, green with a white margin, hooded, produced behind the tip into a rigid point 1—1.5 mm. long, the point either erect or curved outwards. Disc yellow-orange, very small and withering away early. Fruit 4—5 mm. long, 3-angled, narrowed at the top, longer than the perianth. Seeds brown, slightly granular, with a thickened border.

The type is *Zeyher* 616 (S).

Open sand or gravel in the N.W. Cape and S.W. Africa. Often on disturbed ground. Very easily overlooked.

Young plants appear white owing to the prominent stipules, old ones become orange-coloured. The plants distributed by *Schlechter* (87) under the MS name "*P. Adenogramma*" only differ in having slightly longer leaves and more numerous flowers.

S.W. AFRICA. Aus *Dinter* 3622 (BM.BOL): 6059 (BOL.K): Klinghardtberg *Dinter* 4014 (BM): Kl. Karas *Dinter* 4789 (BOL.G.Z).

NAMAQUALAND. Springbok *Zeyher* 617 (BM.BOL.CGE.G.K.S. SAM), s.n. (S).

GORDONIA. Upington *Barnard* (SAM): *Glover* (BOL).

CALVINIA. Kraaiwater *Schlechter* 87 (BM.BOL.K), s.n. (BM.G.Z).

KENHARDT. Aughrabies *Barnard* (SAM): Kakamas *Adamson* 2055: *Lewis* (SAM).

CLANWILLIAM. Graafwater *Adamson* 4511.

COELANTHUM

Fenzl Ann. Wien. Mus. 1: 363. 1836.

Coelanthium Sond. Fl. Cap. 1: 147. 1860.

Annual herbs with a basal rosette of leaves and flowering shoots with whorls of leaves. Stipules membranous, persistent, lacerate. Cymes pedunculate, the flowers pedicellate. Perianth segments 5, united for at least half their length. Stamens 5, attached to the perianth tube, alternate with the lobes. Disc wanting. Ovary superior 3-chambered; stigmas 3, short. Seeds numerous.

The type species is *C. grandiflorum* E. Mey. ex Fenzl.

Spring annuals drying up and withering away after flowering. The flowers open in the afternoon. Leaves commonly red in the older stages. Allied to *Pharnaceum* and much like the annual species of that genus, but distinguished by the united perianth, the stamens attached to the perianth, and the lack of a disc. The genus is confined to low ground on the western coastal belt between the Cape and S.W. Africa.

KEY TO THE SPECIES.

1. Basal leaves narrowed to the base but not petiolate, narrow-oblong or linear-oblong; cymes many flowered; lobes of the perianth shorter than the tube 2. *semiquinquefidum*
1. Basal leaves petiolate, the blades oblong or spatulate.
 2. Basal leaves persistent, the cauline in few whorls; cymes many-flowered; lobes of the perianth as long as the tube 1. *grandiflorum*
 2. Basal leaves soon withering, the cauline in many whorls; cymes few flowered; lobes of the perianth shorter than the tube 3. *verticillatum*

1. **C. grandiflorum** E. Mey. ex Fenzl Ann. Wien. Mus. 2: 267. 1840.

C. longiaristatum Dinter Fedde Rep. 16: 343. 1920.

Annual with 1—8 flowering shoots from a rosette. Flowering shoots up to 15 cm. long, usually spreading in a circle, rarely erect. Basal leaves petiolate, the blades oblong or elliptical, 0.5—2 cm. long, 0.3—0.7 cm. wide, acute, usually hair-pointed, the petioles 0.3—1 cm. long. Stipules cut into narrow lobes or coarse threads, half as long as the petioles. Stem leaves not petiolate, linear or narrow-oblong, 0.4—1.2 cm. long, in whorls of 8; stipules about 2 mm. long. Flowering shoots with 1—3 whorls of leaves separated by internodes 3—5 cm. long. Inflorescence dichasial: pedicels slender, 3—5 mm. long. Perianth about 3 mm. long, funnel-shaped, green or brown, the free lobes as long as the tube, cucullate, white-edged. Stigmas very short. Fruit slightly longer than the perianth. Seeds compressed, minutely granulate.

The type, *Drege* 3023 (W), is lost, lectotype *Drege* (*C. spathulatum*) (S).

Sand or gravel on the N.W. coastal belt.

Variable in size. Very commonly red. Basal leaves persistent at the fruiting stage. The flowering shoots spread almost horizontally. *C. longiaristatum* only differs in having longer hair-points to the leaves.

S.W. AFRICA. Klinghardtberg *Dinter* 3887 (BOL.PRE).

NAMAQUALAND. Groot Derm *Pillans* 5269 (BOL.K); Klipfontein *Bolus* 9528 (BOL), 9529 (BOL.K); Hondeklip Bay *Adamson* 4996, 5021, 5026.

VAN RHYNSDORP. Van Rhynsdorp *Barker* 5711 (BOL.NBG); *Wilman* 708 (BOL) Van Rhyns Pass *Adamson* 4538; Klaver *Adamson* 4969; *Lavis* (BOL); *Maguire* 940 (NBG).

CLANWILLIAM. Lamberts Bay *Adamson* 4484; Graafwater *Adamson* 4481, 4506; Clanwilliam *Leipoldt* (K); Droogt Riv. *Schlechter* 8326 (BM.BOL.G.GRA.K.Z); Barrage *Adamson* 4956; Leipoldville *Zinn* (SAM).

PIKETBERG. Het Kruis *Stephens & Glover* 8724 (BOL.K); btn. Sauer & Velddrift *Wilman* 746 (BOL).

Without locality:—*Drege* (*C. spathulatum*) (BM.G.K.OXF); *Drege* (*Ph. croceum*) (SAM).

2. **C. semiquinquefidum** (Hook.f.) Druce Rep. Bot. Ex. Cl. Br. Is. 1916. 616. 1917.

Pharnaceum semiquinquefidum Hook.f. Ic. Pl. t.83. 1837.

P. ? quinquefidum Walp. Rep. 2: 246. 1843.

C. parviflorum Fenzl Ann. Wien. Mus. 2: 267. 1840.

Annual with 1—3 usually erect flowering stems. Lowest basal leaves oblong, the others linear-oblong, 1.5—3.5 cm. long, 0.2—0.4 cm. wide,

narrowed to the base but not petiolate, at the tip acute, minutely hair-pointed: stipules 3—5 mm. long, cut into narrow lobes or hairs. Stem leaves linear, 1—1.5 cm. long, stipules 1—2 mm. long. Flowering stems with 2—4 whorls of leaves. Inflorescences terminal and at the nodes, the branches pseudoracemose. Pedicels 2—4 mm. long. Perianth 2—4 mm. long, narrowed at the mouth, more or less urceolate, the free lobes shorter than the tube, obtuse, with a narrow white border. Stigmas about 1 mm. long. Fruit about as long as the perianth. Seeds granulate, biconvex, with a slight rim.

The type is *Harvey* 459 (K), of *C. parviflorum*, *Drege* (C.B.S.) (W). Open sand at low altitudes in the S.W. Cape.

Distinguished from *C. grandiflorum* by the narrower not petiolate basal leaves, the larger and more hairy stipules, the firmer inflorescence with pseudoracemose branches, the urceolate perianth with the lobes shorter than the tube, and the less compressed seeds. The name, *C. parviflorum*, is often quoted as dating from 1836. Though the genus was then described there is no mention of the species.

VAN RHYNSDORP. Klaver *Lavis* (BOL.K).

CLANWILLIAM. Heuning Vlei *Leipoldt* 983 (BOL): s.n. (K): Clanwilliam *Bolus* 8999 (BOL): *Guthrie* 3405 (NBG): Olifants Riv. *Schlechter* 5032 (BM.G.K.Z).

HOPEFIELD. Hopefield *Bachmann* 1508 (Z): *Bolus* (BOL): Theefontein *Bachmann* 2118 (Z).

CAPE. Melkbosch Strand *Adamson* 4683: Vygeskraal *Wolley-Dod* 675 (BM.BOL.K): Milnerton *Adamson* 2606, 3109 (CT): Maitland *Guthrie* 1282 (CT): *Wolley-Dod* 3122 (BM.BOL.K): Cape Flats *Zeyher* 621 (BM. CGE.G.K.S.SAM), 630 (K): *Wahlberg* (K): Rosebank *Schlechter* 559 (BOL.Z): Rondebosch *Schlechter* 373 (Z): Claremont *Guthrie* 1141 (CT): Muizenberg *Wolley-Dod* 2318 (BOL): Chapman's Bay *Adamson* 2260 (BOL.CT): *Lewis* (SAM): *Salter* 7811 (BM.BOL.NBG): Simonstown *Bolus* 4681 (BM.BOL.K): *Wright* (K).

WORCESTER. Worcester *Burke* (K).

Without locality:—*Burke & Zeyher* 621 (OXF): *Drege* (G): *Grey* (K): *Harvey* 459 (BM.K): *Lavis* (PRE).

3. *G. verticillatum* Adamson sp. nov.

Annua. Caules procumbentes apice solum ramosi. Folia radicalia et in verticillis pluribus, radicalia ovato-spathulata petiolata, caulina lineari-oblonga sessilia. Cymae pauciflorae aphyllae. Perianthium subcylindricum lobis tubo brevioribus. Capsula perianthio subaequilonga.

A prostrate annual with 1—4 stems, 6—10 cm. long, branched in the upper parts only. Leaves in a basal rosette and in many whorls of 4—8 separated by internodes 1—2.5 cm. long. Basal leaves petiolate, withering about flowering time, the blades ovate-spatulate or almost orbicular, 0.3—1.2 cm. long, 0.2—0.8 cm. wide, the petiole as long as the blade; stipules entire at the base, the upper part cut into coarse threads, about as long as the petiole. Stem leaves sessile, linear-oblong, 0.4—0.6 cm. long, 0.1—0.2 cm. wide, acute, usually aristate, stipules less than half as long as the leaves. Inflorescences terminal and from the upper nodes, on branches with 1—3 whorls of leaves. Cymes dichasial, leafless, with 3—8 flowers. Pedicels 3 mm. long. Perianth about 3 mm. long, almost cylindrical, the ascending lobes half as long as the tube. Fruit about as long as the tube.

The type is *Pillans* 8613 (K).

Open sand near the sea on the N.W. coastal belt.

VAN RHYNSDORP. Liebendal *Acocks* 15003 (PRE).

PIKETBERG. Matjesgoed Drift *Pillans* 8613 (K).

HOPEFIELD. Bokbaai *Esterhuysen* 3820 (BOL).

HYPERTELIS

E. Mey. ex Fenzl Ann. Wien. Mus. 2: 261. 1840.

Hyperstelis Pax Eng. & Prantl Nat. Pflanzf. 1. ed. 3. l.b. 40. 1889.

Glaucous herbs, perennial or annual, sometimes woody at the base. Leaves cylindrical, succulent, alternate and often crowded, or in whorls. Stipules entire, adnate to the leaf base and sometimes clasping the stem, membranous, persistent. Inflorescences axillary, pedunculate, simply umbellate, with few or many pedicellate flowers but no involucre leaves. Perianth segments free, coloured inside, the outer 2—3 thick, the inner thinner and flatter. Stamens 3, 5, 10 or more, when 5 alternate with the perianth segments, when more than 5 some or all in pairs or bunches slightly united at the base. Disc wanting. Ovary 3 or 5-chambered, with numerous ovules. Stigmas 3 or 5, short. Seeds triangular or pear-shaped.

The type species is *H. salsoloides* (Burch.) Adamson (*H. verrucosa* E. & Z.).

An African genus occurring for the most part on salty soils. The greatest number of species occur in S.W. Africa and the N.W. Cape but the genus extends to Abyssinia and is represented in Madagascar and in St. Helena. By many authors united to *Pharnaceum* but very distinct in the succulent leaves, the entire adnate stipules, the simply umbellate inflorescence, the lack of a disc, and the seeds.

In this genus all the species are here described.

KEY TO THE SPECIES.

1. Leaves basal and in distant whorls 7. *spergulacea*
1. Leaves on the stem alternate or sub-opposite, usually crowded, not in whorls.
 2. Perennial: stems woody at least at the base.
 3. Stipules inconspicuous, often deciduous: flowers over 6 mm. long 6. *acida*
 3. Stipules apparent, persistent: flowers not over 4 mm. long.
 4. Stamens more than 10.
 5. Peduncles, pedicels or perianth with projecting glandular warts: leaves cylindrical 1. *salsoloides*
 5. Peduncles, pedicels and perianth smooth: leaves more or less spatulate 4. *angrae-pequenae*
 4. Stamens 10 or fewer: peduncles smooth.
 6. Stems woody, elongate: leaves slender: stamens 10 2. *suffruticosa*
 6. Stems short, woody at the base only: stamens 5.
 7. Leaves cylindrical: umbels 4—8-flowered: pedicels less than 1.8 cm. long 3. *Bowkeriana*
 7. Leaves flattened: umbels 2—3-flowered: pedicels 1.5—2 cm. long 5. *caespitosa*
 2. Annual: stems quite herbaceous.
 8. Peduncles shorter than the leaves: stamens 3: seeds smooth 8. *arenicola*
 8. Peduncles longer than the leaves: stamens 5: seeds tuberculate 9. *trachysperma*

1. *H. salsoloides* (Burch.) Adamson comb. nov.*Pharnaceum salsoloides* Burch. Trav. 1: 286. 1823.*P. verrucosum* Ecklon & Zeyher Enum. 286. 1837.*H. verrucosa* Fenzl Ann. Wien. Mus. 2: 262. 1840.

In small or large bunches. Stems woody at the base, 2—20 cm. long, ascending or prostrate, usually with many short erect branchlets. Leaves crowded, glaucous, cylindrical, 1.5—4 cm. long, usually erect. Stipules with acute or acuminate ascending or divaricate points. Peduncles stout, 3—15 cm. long, smooth or more commonly with few or many projecting glandular warts on the upper part. Pedicels 3—12, 0.5—2 cm. long, usually with wart-like glands, ascending at anthesis but deflexed in bud and at the fruiting stage. Perianth segments 3—5 mm. long, white or pink inside, the outer with wart-like glands on the back. Perianth deflexed at anthesis. Stamens 12—15: anthers bright yellow. Fruit as long as or slightly longer than the perianth. Seeds dark brown or black, triangular, smooth.

The type is *Burchell* 1580 (K), of *H. verrucosa*, *Zeyher* 615 (S).

Throughout the drier regions, in depressions with fine grained salty soil. Much eaten by sheep. Occasionally used as a salad plant.

Very variable in size, especially in the length of the leaves and inflorescence. The type specimen, *Burchell* 1586, is of a rather small compact

form with short leaves. A large form with less crowded leaves 3—4 cm. long, and a tall inflorescence, 10—15 cm., with pedicels 1—2 cm. long, occurs in Namaqualand and S.W. Africa. While superficially different-looking, there seems no differentiating feature except size. All intermediates can be found. These variations seem largely dependent on habitat. Where little moisture is held the plants are small, close to the ground and with short leaves. Increase in size follows increases in the amount of moisture. Grazed plants are small and compact. With all its variability the species is clearly separated from all others by the glandular warts on the inflorescence, the number of stamens, and the deflexed buds and fruits. The numbers of glands show much variation, from numerous all over the inflorescence to very few on the perianth and pedicels. There are all stages of intermediate.

S.W. AFRICA. Windhoek *Moss* 17854 (BM): Gobabis *Liebenberg* 4542 (PRE): Inhab *Dinter* 1006 (Z): Khukhos *Schenck* 76, 157 (Z): Aus *Dinter* 515 (BM.SAM.Z), 6034 (BM.BOL.K.S): *Pearson* 3699 (BOL.K): Narudas Sud *Pearson* 8337 (BM.BOL.K.SAM): Nasob *Fleck* 358 (Z): Swakopmund *Compton* (BOL): *Dinter* 8432 (K): Alicetal *Dinter* 6358 (BOL.K): Bullspoort *Liebenberg* 5120 (PRE): *Strey* 2090 (PRE): Schakalskuppe *Pearson* 4236 (K.SAM): Hass *Pearson* 9528 (K): Nanchas *Macdonald* 450 (BM): Withobus *Pearson* 8965 (BOL.K): Heikamchab *Galpin & Pearson* 7483, 7458 (K): Grumen *Wilman* (BOL): Bethanien *Kinges* 2082 (PRE): Auasberg *Dinter* 8368 (PRE): Nankloof Mts. *Rodin* 2859 (BOL): Gt. Karasberg *Engler* 6659 (K): Kl. Karas *Ortendal* 36 (K), 218 (PRE): Warmbad *Fleck* 335a (Z), 22 (Z): Hereroland *Dinter* 79 (Z): s.l. *Dinter* 518 (K): *Fenchet* 121 (Z): *Pohle* 61 (Z): *Schinz* 874, 875-6 (Z).

NAMAQUALAND. Port Nolloth *Bolus* 9254 (BOL.K), 9255 (BOL.K), 9256 (BOL): *Pillans* 5188 (BOL): Viols Drift *Thorne* (SAM): Verlept-pram *Drege* (S): Pella *Pearson* 3588 (K): Groot Derm *Pillans* 5326 (BOL): Ramans Drift *Pearson* 4063, 4527 (K): Alwynsfontein *Pearson* 3324, 3336 (K): Jakalsfontein *Drege* (S): Corkscrew *lets Pearson* 5731 (K): Doorn Poort *Pillans* 5380 (BOL): Springbok *Lewis* (SAM): *Salter* 3788 (BM): Buffels Riv. *Leighton* 1187 (BOL): Klipplaat *Pearson* 3398, 3402 (K): Hondeklip Bay *Pillans* (BOL): Bitterfontein *Pearson* 3412 (K): *Zeyher* 2842 (S.SAM): s.l. *Acocks* 14217 (PRE): *Scully* (BM.K).

VAN RHYNSDORP. Van Rhynsdorp *Adamson* 4541: *Stokoe* (SAM).

CLANWILLIAM. Lang Kloof *Schlechter* 8031 (BM.BOL.K.Z).

GORDONIA. Keimoes *Barnard* (SAM): Upington *Glover* s.n. (BOL. 13361) (Z): Norugas *Barnard* (SAM).

KENHARDT. Btn. Upington & Kenhardt *Adamson* 2081: *Lewis* (SAM): Aughrabies *Pearson* 3571 (K): Kakamas *Wasserfall* 1075 (PRE).

- CALVINIA. Zak Riv. *Burchell* 1580 (K); Elands Vlei *Lindeberg* (S).
 PRIESKA. Prieska *Bryant* 179 (K.PRE), J209 (PRE).
 HAY. Karreefontein *Wilman* (SAM).
 KIMBERLEY. Kimberley *Esterhuysen* 809 (BOL); *Lewis* (SAM); Riet Pan *Moran* (SAM); *Wilman* (PRE).
 BARKLY WEST. Newlands *Paton* (PRE); Schiet Pan *Acocks* 1642 (BOL.PRE); Dunmurray *Pole-Evans* 64 (K.PRE).
 KURUMAN. Doorn Draai *Sitwell* 55 (PRE).
 VRYBURG. Tiger Kloof *Brueckner* 290 (PRE); Armoedsvlakte *Mogg* 8765 (CGE); *Sharpe* 7466 (PRE); Biesjesvlakte *Henrici* 173 (PRE).
 HOPETOWN. Hopetown *Maskell* 31 (BOL).
 COLESBERG. Orange Riv. *Knobel* (K).
 WORCESTER. Touws Riv. *Lightfoot* (SAM).
 LAINGSBURG. Laingsburg *C. A. Smith* (PRE); Gamka Riv. *Burke* (BM.Z); *Ecklon & Zeyher* 1826 (SAM); *Zeyher* 615 (S).
 PRINCE ALBERT. Prince Albert *Tugwell* (BOL); Klaarstroom *Drege* (S).
 BEAUFORT WEST. Nelspoort *Fries, Norlandh & Weimarek* 1758 (BOL); Klipbank *Rogers* 17181 (PRE.Z); Fraserburg Rd. *C. A. Smith* 2503 (PRE); rd. to Loxton *Adamson* 5280; rd. to Aberdeen *Adamson* 5278; Nieuwveld *Schenck* 692 (Z).
 ABERDEEN. Aberdeen *Acock* 3709 (PRE); *Adamson* 5278; *Hutchinson* 3134 (BOL.K).
 GRAAFF-REINET. Graaff-Reinet *Bolus* 657 (BOL); *Ecklon & Zeyher* 88 (S); *Thode* 573 (K).
 MIDDELBURG. Middelburg *Comins* 801 (PRE); *Gill* 123 (PRE); Ouberg *Theron* 348 (PRE); Conway Farm *Gilfillan* 5524 (K).
 CRADOCK. Cradock *Cooper* 508 (BM.K.Z); *Dyer* 1535 (K); Mortimer *Kensit* (PRE); "KMS" 9267 (BOL).
 SOMERSET EAST. Melk Riv. *MacOwan* (SAM); Lake Mentz *Long* 219 (K).
 ROBERTSON. Ashton *Rogers* (K).
 LADISMITH. Little Karroo *Adamson* 4600.
 SWELLENDAAM. Bonnievale *Leighton* (BOL).
 RIVERSDALE. Muiskraal *Adamson* 4594.
 MOSSEL BAY. Gouritz Riv. *Ecklon & Zeyher* 94.12 (S), 1826 (S).
 UITENHAGE. Coega *Ecklon & Zeyher* 79.4 (S).
 ALBANY. Carlisle Bridge *Dyer* 2109 (K.PRE).
 TROMPSBURG. Trompsburg *Kies* 262 (PRE).
 FAURESMITH. Luckhoff *C. A. Smith* 484 (PRE); Rosemarie *Brueckner* 980 (PRE); *Verdoorn* 2149 (PRE); Kl. Irijskop *Pole Evans* 1885 (PRE); Knoffelfontein *C. A. Smith* 5360 (PRE); Groen Vlei *Rabie* (PRE); *C. A. Smith* 3922 (PRE); *Verdoorn* 2086 (PRE).

- BLOEMFONTEIN. Eagles Nest *Potts* 2853 (PRE).
KROONSTAD. Kroonstad *Pont* 273 (PRE.Z).
O.F.S. s.l. Burke (K).
VEREENIGING. Vereeniging *Burt-Davy* 15021 (PRE).
POTCHEFSTROOM. Boskop *Murray* 767 (PRE).
KLERKSDORP. Klerksdorp *Martin* 6 (PRE); Salt Pan *Mogy* 24404 (PRE).
BLOEMHOF. Bloemhof *Leistner* 66 (PRE).
LICHTENBURG. Lichtenburg *Kinges* 1893 (PRE).
PRETORIA. Pretoria *Repton* 1334 (PRE).
RUSTENBURG. Magaliesberg *Wahlberg* (S).
WATERBERG. Warmbaths *Leendertz* 1767 (CGE); *Thode* A.1669A (PRE); Nylstroom *Burt-Davy* 2118 (PRE); *Prosser* 1692 (PRE).
PIETERSBURG. Majuba Kloof *Pott* 4546 (K).
BECHUANALAND. Gaborones v. *Son* (K).
Without locality:—*Burke & Zeyher* 615 (CGE); *Drege* s.n. (G) (*Ginginsia canescens*) (K); *Goodenough* (K); *Masson* (BM); *Rehmann* 3107 (Z); *Thunberg* (S); *Wahlberg* (S); *Zeyher* 615 (BM.BOL.CGE).
Also in Angola and S. Rhodesia.

2. ***H. suffruticosa*** (Baker) Adamson comb. nov.

Pharnaceum suffruticosum Baker J. Linn. Soc. Bot. 26: 151. 1886.

A glaucous sprawling plant with branching stems 20—30 cm. long, woody in the older part. Leaves very slender, 0.8—1.4 cm. long, alternate, crowded, with axillary fascicles. Stipules with a broad lateral flap, usually ending in an acute point. Peduncles numerous, slender, smooth, 5—8 cm. long. Umbels with 2—3 flowers. Pedicels smooth, 1—2 cm. long. Perianth segments about 3 mm. long, obtuse. Stamens 10. Stigmas short. Fruit ovoid-oblong, as long as the perianth. Seeds brown, pear-shaped.

The type is *Pervillé* 647 (K).

Endemic in Madagascar. Ambongo *Pervillé* 647 (K).

3. ***H. Bowkeriana*** Sond. Fl. Cap. 1: 145. 1860.

Glaucous. In loose bunches. Stems 3—12 cm. long, woody at the base, ascending or decumbent, branched. Leaves alternate, usually with axillary fascicles, slender, 3—6 cm. long, often with projecting glandular warts. Stipules with rather divaricate acute or acuminate lobes. Peduncles 5—9 cm. long, smooth, 4—8-flowered. Pedicels 0.5—1 cm. long, smooth, ascending but deflexed in fruit. Perianth without glands, about 3 mm. long. Stamens 5. Fruit slightly longer than the perianth. Seeds brown, triangular, smooth, shining, usually with a distinct border.

The type is *Bowker* (K).

Salty soils in the summer rainfall regions.

Like slender forms of *H. salsoloides* but distinguished by the absence of warts on the inflorescence, the shorter pedicels, and the flowers with five stamens. The plant described as *Mollugo suffruticosa* A. Peters Fedde Rep. 40.2: 29. 1938, has not been seen but from the description and figure seems to be a slender form of this species. It was found in S.W. Africa.

STEYTLERVILLE. Darlington *I. L. Drege* 906 (G).

ALBANY. Piggots Bridge *Adamson* 5265; Fish Riv. *Dyer* 1535 (PRE); Plutos Vale *Story* 2283 (PRE); Grahamstown *Bowker* (K).

CRADOCK. Cradock *Dyer* 2109 (PRE).

KOMGHA. Kei Riv. *Flanagan* 2320 (PRE).

NATAL. Muden *Cronwright* (PRE); s.l. *Gerrard* 1187 (K).

WOLMARANSSTAD. Boskuil *Sutton* 311 (PRE).

NELSPRUIT. Nelspruit *Acocks* 16720 (PRE); *Codd & de Winter* 5021 (K.PRE); Komati Poort *Schlechter* 11867 (Z).

WATERBERG. Haakdoorn *Rogers* 22809 (PRE).

PIETERSBURG. Marabastad *Schlechter* 4344 (BM.G.K.S.Z).

ZOUTPANSBERG. Zoutpan *Schweickerdt & Verdoorn* 534 (K.PRE); "O.S.V" 289 (K); Messina *Rogers* 21749 (G).

"S. AFRICAN GOLDFIELDS" *Baines* (K).

BLOEMFONTEIN. Rhenosterspruit *Potts* 2592 (K.PRE).

BECHUANALAND. Mochudi *Rogers* 6895 (G.PRE); Klippan *Rehmann* 5193 (Z).

Also in S. Rhodesia and northwards to Abyssinia.

4. *H. angrae-pequenae* Friedrich Mitt. Bot. Munch. 12: 62. 1955.

Pharnaceum obtusifolium Pax Engl. Pflanzw. Afrik. 1: 518. f.438. 1910 (nom. nud.)

A rather large woody much branched succulent in low bunches 20—25 cm. across. Stems 10—20 cm. Leaves succulent, crowded, oblong-spatulate, 0.6—1.5 cm. long, 0.2—0.4 cm. wide, flattened, obtuse, smooth, narrowed at the base. Stipules 3—4 mm. long, with a spreading acuminate point. Peduncles smooth, 1—1.5 cm. long, with 1, less often 2—3 flowers. Pedicels 0.5—1 cm. long. Perianth segments 4—4.5 mm. long, obtuse, incurved. Stamens 10—15. Stigmas 5, spreading horizontally. Seeds dark brown, compressed, asymmetrically pear-shaped, finely rugose.

The type is *Kinges* 2799 (Z).

Dry river beds near the coast in S.W. Africa.

Distinctive in the woody habit, flattened leaves, and rather large usually solitary flowers. Pax (l.c.) figured the species but did not describe it.

S.W. AFRICA. Rehoboth *Fleck* 334a (Z): Luderitz *Dinter* 3839 (PRE): *Hobart-Hampden* 22 (BM): *Kinges* 2799 (PRE): Alicetal *Dinter* 6364 (BM.BOL.G.K.PRE.S).

5. **H. caespitosa** Friedrich Mitt. Bot. Munch. 12: 64. 1955.

Tufted, with many short decumbent stems from a woody rootstock. Stems 2—6 cm. long. Leaves subopposite, crowded, 1—1.5 cm. long, cylindrical, glaucous. Stipules, with acute ascending points, the edges slightly denticulate. Peduncles slender, smooth, 2—3.5 cm. long, with 2—3 flowers. Pedicels 1.2—2 cm. long, smooth, with a tuft of stipules at the base. Perianth 3.5—4 mm. long. Stamens 5. Stigmas 3 or more commonly 5, cylindrical, spreading, red. Fruit rounded, slightly longer than the perianth.

The type is *Dinter* 8471 (M).

Endemic to the coastal part of S.W. Africa.

Allied to *H. Boukeriana* but much more woody, more compact, with shorter thicker leaves, different stipules, and umbels with few flowers on long pedicels.

S.W. AFRICA. Cape Cross *Dinter* 8471 (BM.PRE.S.Z).

6. **H. acida** (Hook.f.). K. Müller Bot. Jahrb. 42. Beih. 97: 62. 1908.

Pharnaceum acidum Hook.f. Ic. Pl. t.1035. 1867.

A large sprawling succulent. Stems decumbent, woody at the base, pale-coloured, up to 40 cm. long. Leaves alternate, not crowded, 3—4 cm. long, 0.3 cm. diam., narrowed to the base, often with axillary fascicles. Leaves smooth or with glands on the surface. Peduncles axillary, stout, 7—12 cm. long. Umbels with 7—15 flowers: pedicels erect but deflexed in fruit, 1—2 cm. long. Perianth 6—8 mm. long, with warts on the outside. Stamens 10—20. Stigmas 5. Fruit as long as the perianth.

The type is *Burchell* (St. Helena) (K).

Endemic to St. Helena. Used as a salad plant. The largest of the species.

ST. HELENA. Haughton *Burchell* (K): Sandy Bay *Kerr* 3 (BM).

7. **H. spergulacea** E. Mey. ex Fenzl Ann. Wien. Mus. 2: 263. 1840.

A glabrous glaucous plant with erect stems in bunches from a woody rootstock. Aerial stems 10—30 cm. high, rather rigid, green, mostly

unbranched, with whorls of leaves separated by internodes 2—8 cm. long. Leaves cylindrical, fleshy, narrowed to the base, both basal and in whorls of 4—6 along the stem. Basal leaves 1.5—2 cm. long, about 2 mm. diam., narrowed to a short petiole about 1 mm. long; stipules forming obtuse lateral bulges 1—2 mm. long, with a projection on the upper margin ranging from a small knob to a falcate process 1 mm. long. Stem leaves similar but smaller, 1—1.5 cm. long, with small stipules without a projection or with a very small one. Inflorescences axillary. Peduncles slender, 1.5—4 cm. long. Umbels with 3—4 flowers, rarely 6. Pedicels 1—2 cm. long, spreading or deflexed at the fruiting stage. Perianth smooth, 3—4 mm. long. Stamens 20—30, usually in groups. Stigmas 3—5, yellow, rather thick. Fruit as long as the perianth. Seeds lenticular.

The type, *Drege* 3020 (W), is lost: lectotype *Drege* (*H. spergulacea*) (K).

Dry sandy or rocky places especially in river beds, in S.W. Africa and Namaqualand.

A very distinctive species in habit. In collections there has been some confusion with *Pharnaceum lineare* but it is easily separated by the entire stipules, simple inflorescence, and habit. *Drege's* specimens lack the woody rhizome and basal leaves. The rhizome may be in or on the ground.

S.W. AFRICA. Garius *Dinter* 4247 (BM.PRE): Kalkenstad *Dinter* 8233 (K): Angarn *Dinter* 1005 (Z): Aus *Pillans* 6486 (BOL.K): *Schenck* 332 (Z): Rooival *Pillans* 6407 (BOL): Kl. Karas *Pearson* 9734 (K): Bethany Drift *Pearson* 6033 (K).

NAMAQUALAND. Ramans Drift *Pearson* 4077 (BOL.K): Orange Riv. (Verleptpram) *Drege* (*H. spergulacea*) (K.S): Anisfontein *Pillans* 5293 (BOL.K): Doornpoort *Pearson* 6133 (K).

CALVINIA. Gt. Bushmanland *Pearson* 3019 (K).

8. *H. arenicola* Sond. Fl. Cap. 1: 145. 1860.

A glaucous prostrate annual with ascending branches, often purplish when old. Stems 2—8 cm. long, several from the root. Leaves alternate, cylindrical, 0.6—2 cm. long, often slightly glandular. Stipules 2—3 mm. long, with acute points. Inflorescences axillary. Peduncles 0.5—0.8 cm. long, usually shorter than the leaves. Umbels with 3—5 flowers. Pedicels 3—6 mm. long. Perianth segments cucullate, 1.5—2 mm. long. Stamens usually 3, rarely 5. Fruit rounded, not longer than the perianth. Seeds brown or black, kidney-shaped, shining, very minutely punctate.

The type is *Zeyher* 619 (S).

Damp brackish fine-grained soils near the coast.

In circular patches. A short-lived summer annual.

CAPE. Doornhoogte *Zeyher* (SAM): Riet Vlei *Acock* 1224 (S): *Adamson* 3307 (CT.SAM). 4757: *Moss* 9074 (BM): *Salter* 8708 (BOL.CT).

PRE): Paarden Is. *Acock* 3916 (S): Salt River *Burchell* 690 (K): Cape Town *Hafstrom* (S): Green Point *Zeyher* 619 (BM.BOL.CGE.K), s.n. (SAM): Mowbray *Bolus* (BOL).

UITENHAGE. Redhouse *Paterson* 2219 (BOL.K.Z).

Without locality:—*Burke* (K): *Wallich* (BM.CGE.G).

9. **H. trachysperma** Adamson J. S. Afr. Bot. 12: 35. 1946.

A succulent glaucous often purplish annual. Stems usually prostrate, up to 15 cm. long. Leaves terete or obtusely trigonous, 2—6 cm. long. Stipules with acuminate points. Peduncles axillary, 3—5 cm. long, as long as or longer than the leaves. Umbels with 3—10 flowers. Pedicels 0.3—1 cm. long, slightly thickened at the top. Perianth about 2 mm. long. Stamens 5, anthers rotund. Stigmas 4—5, very short. Fruit subspherical, as long as the perianth. Seeds black, reniform, covered with sharp tubercles.

The type is *Walgate* 687 (BOL).

Endemic to the Cape Flats. An autumn annual at the margins of vleis.

CAPE. Zeekoe Vlei *Adamson* 3660 (CT): *Walgate* 671, 687 (BOL. SAM): Kommetjie *Adamson* (CT).

Uncertain species.

H. longifolia Gandoger Bull. Soc. Bot. Fr. 59: 708. 1912.

No specimen has been seen. As the description mentions both sepals and petals, it may belong to some other genus.

INDEX OF NUMBERED SPECIMENS QUOTED.

ACOCK(S). 313 *P. aurantium*; 502 *P. croceum*; 682 *P. cordifolium*; 708 *P. lanatum*; 742 *P. elongatum*; 876 *P. lineare*; 1234 *H. arenicola*; 1472 *P. dichotomum*; 1641 *M. cerviana*; 1642 *H. salsoloides*; 1694 *P. aurantium*; 1906 *P. viride*; 1933 *P. trigonum*; 2077 *P. aurantium*; 2081 *M. cerviana*; 2126 *P. exiguum*; 2131 *P. viride*; 2189 *P. subtile*; 2510 *P. cordifolium*; 2527 *P. elongatum*; 3022 *P. confertum*; 3098 *P. serpyllifolium*; 3184 *P. rubens*; 3916 *H. arenicola*; 5709 *H. salsoloides*; 13182 *P. trigonum*; 13597 *P. Thunbergii*; 13688 *P. trigonum*; 14179 *P. trigonum*; 14217 *H. salsoloides*; 14799 *P. confertum*; 14803 *P. exiguum*; 15003 *C. verticillatum*; 15118 *P. albens*; 15710 *P. detonsum*; 16119 *P. dichotomum*; 16463 *P. albens*; 16515 *P. trigonum*; 16487, 16680 *M. cerviana*; 16720 *H. Bowkeriana*; 17230 *M. tenella*; 17507 *P. trigonum*; 17704 *P. croceum*.

ACOCKS & HAFSTROM. 431 *P. brevicaule*; 432 *P. viride*.

ADAMSON. 981 *P. elongatum*; 1043 *M. tenella*; 1185, 1591 *P. elongatum*; 2055 *P. scleranthoides*; 2081 *H. salsoloides*; 2260, 2606 *C. semiquinquefidum*; 2866 *P. elongatum*; 2910 *P. lanatum*; 2920 *P. exiguum*; 2935, 2967 *P. elongatum*; 2970 *P. lanatum*; 2986 *P. exiguum*; 3109 *C. semiquinquefidum*; 3197 *P. exiguum*; 3307 *H. arenicola*; 3515 *P. elongatum*; 3668 *H. trachysperma*; 3821 *P. fluviatilis*.

- 3976 *P. elongatum*; 3982 *P. dichotomum*; 4259, 4401 *P. aurantium*; 4407 *P. dichotomum*; 4411 *P. elongatum*; 4480 *P. exiguum*; 4481, 4484, 4506 *C. grandiflorum*; 4509-10 *P. exiguum*; 4511 *P. scleranthoides*; 4517 *P. confertum*; 4520 *M. tenella*; 4524 *P. confertum*; 4531 *M. tenella*; 4533 *P. confertum*; 4538 *C. grandiflorum*; 4541 *H. salsoloides*; 4546 *P. confertum*; 4547 *P. detonsum*; 4549 *M. tenella*; 4564 *M. tenella*; 4565-6-7 *P. exiguum*; 4584 *P. aurantium*; 4585 *P. dichotomum*; 4587 *P. aurantium*; 4594, 4600 *H. salsoloides*; 4603, 4605 *P. dichotomum*; 4615 *P. fluviale*; 4623, 4633, 4635 *P. dichotomum*; 4646, 4666 *P. elongatum*; 4667 *P. lanatum*; 4669 *P. confertum*; 4670 *P. exiguum*; 4673, 4679 *P. lanatum*; 4683 *C. semiquinquefidum*; 4686 *P. elongatum*; 4694-5, 4705, 4710-4714-5, 4720-1, 4725-6 *P. dichotomum*; 4735 *P. exiguum*; 4739 *P. cordifolium*; 4743-4-5 *P. dichotomum*; 4757 *H. arenicola*; 4758 *P. elongatum*; 4765 *P. trigonum*; 4852 *P. elongatum*; 4855, 4859 *P. trigonum*; 4864, 4866 *P. fluviale*; 4921-2 *P. dichotomum*; 4940 *P. fluviale*; 4944 *P. elongatum*; 4945 *P. lanatum*; 4949 *P. elongatum*; 4950 *P. lanatum*; 4951 *P. elongatum*; 4956 *C. grandiflorum*; 4957 *P. incanum*; 4958 *P. exiguum*; 4963 *P. incanum*; 4964-5 *P. dichotomum*; 4969 *C. grandiflorum*; 4994-5 *P. confertum*; 4996 *C. grandiflorum*; 4997 *P. exiguum*; 4999, 5000 *P. confertum*; 5003 *P. exiguum*; 5004 *P. confertum*; 5008 *P. aurantium*; 5014 *P. confertum*; 5021 *C. grandiflorum*; 5022 *P. confertum*; 5026 *C. grandiflorum*; 5028 *P. confertum*; 5029 *P. exiguum*; 5031 *P. exiguum*; 5033, 5037 *P. aurantium*; 5039-40 *P. confertum*; 5042 *P. confertum* v. *brachyphyllum*; 5054-5 *P. aurantium*; 5057 *P. confertum* v. *brachyphyllum*; 5059 *P. aurantium*; 5062 *P. confertum* v. *brachyphyllum*; 5064 *P. albens*; 5065, 5067 *P. elongatum*; 5066 *P. confertum* v. *brachyphyllum*; 5068 *P. incanum*; 5071, 5074-5-6 *P. incanum*; 5090-1-2 *P. aurantium*; 5098 *P. dichotomum*; 5128, 5138 *P. ciliare*; 5157; *P. fluviale*; 5158-9-60 *P. elongatum*; 5171 *P. dichotomum*; 5173, 5180-1, 5183, 5195 *P. dichotomum*; 5196 *M. cerviana*; 5201, 5203 *P. trigonum*; 5224 *P. lineare*; 5228-9, 5230-1 *P. dichotomum*; 5265 *H. Bourkeriana*; 5266 *P. trigonum*; 5278-9, 5280 *H. salsoloides*.
- BACHMANN. 1505, 2213 *P. elongatum*; 1508 *C. semiquinquefidum*; 2103 *P. lanatum*; 2112 *P. aurantium*; 2118 *C. semiquinquefidum*; 2135-6 *P. lanatum*.
- BALLY. 5247 *H. Bourkeriana*.
- BARKER. 2625 *P. microphyllum*; 4736 *P. albens*; 5711 *C. grandiflorum*.
- BOLUS. 533 *P. detonsum* & *dichotomum*; 622 *P. cordifolium*; 657 *H. salsoloides*; 819 *P. elongatum*; 1159 *M. tenella*; 2719 *P. elongatum*; 3284 *P. lineare*; 4681 *C. semiquinquefidum*; 5163 *P. dichotomum*; 5164 *P. confertum*; 5649 *P. aurantium*; 5650 *P. aurantium*; 6641 *M. namaquensis*; 6648 *M. tenella*; 8998 *M. pusilla*; 8999 *C. semiquinquefidum*; 9254-5-6 *H. salsoloides*; 9517 *P. confertum*; 9518 *P. aurantium*; 9519 *P. albens*; 9520, 9522 *P. aurantium*; 9524 *P. croceum*; 9525 *H. salsoloides*; 9526 *H. salsoloides*; 9528-9 *C. grandiflorum*; 12698 *P. lanatum*; 13112 *P. incanum*; 13858 *P. dichotomum*; 14053 *P. trigonum*.
- BRANDMULLER. 120 *M. cerviana*.
- V. BREDÁ. 33 *P. aurantium*.
- BRIERLEY. 144 *M. cerviana*.
- BRITTEN. 688 *P. Thunbergii*; 4423 *P. lineare*.
- BRUECKNER. 290, 980 *H. salsoloides*.
- BRYANT. J84 *M. cerviana*; 179, J179, J209 *H. salsoloides*.
- BURCHELL. 1-964 *P. elongatum*; 134 *P. elongatum*; 368A *P. dichotomum*; 644 *P. elongatum*; 690 *H. arenicola*; 1580 *H. salsoloides*; 1666 *P. trigonum*; 2022 *M. cerviana*; 2140 *P. viride*; 2259 *P. brevicaulis*; 2627 *P. viride*; 3720 *P. Thunbergii*; 3684 *P. fluviale*; 4552 *P. Thunbergii*; 6209 *P. trigonum*; 6492 *P. dichotomum*.

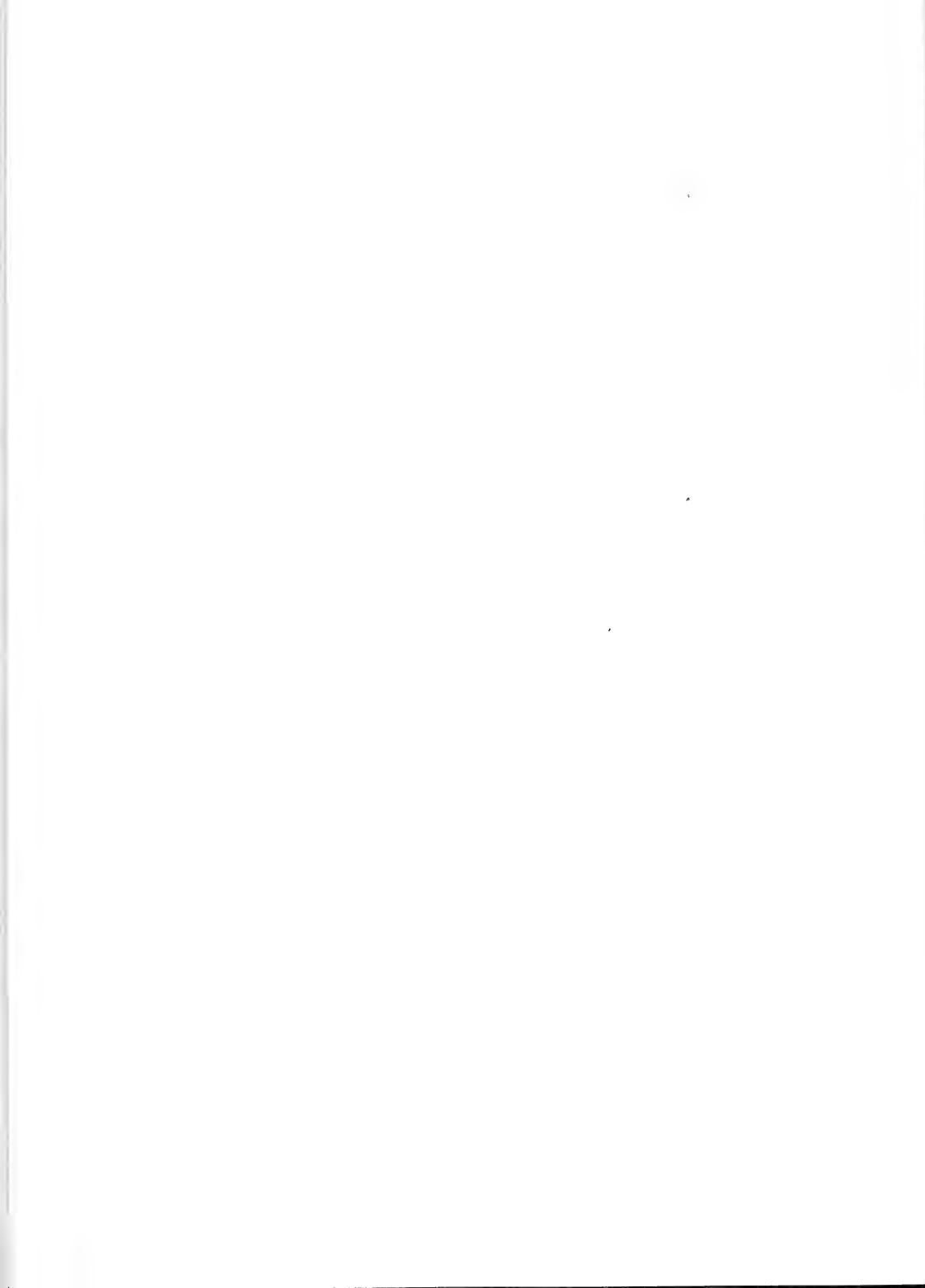
- BURKE & ZEYHER. 613 *M. cerviana*: 615 *H. salsoloides*: 621 *C. semiquinquefidum*: 622 *M. cerviana*: 623 *P. lineare*.
- BURTT-DAVY. 2118 *H. salsoloides*: 7945 *P. elongatum*: 11762 *P. dichotomum*: 11885 *P. dichotomum*: 14448 *M. cerviana*: 15021 *H. salsoloides*.
- CODD & DE WINTER. 4983 *M. nudicaulis*.
- CODD & DYER. 3845 *M. nudicaulis*.
- COMINS. 801 *H. salsoloides*: 824, 923 *M. cerviana*: 1040 *P. Thunbergii*.
- COMPTON. 12085 *P. lanatum*: 13224 *P. aurantium*: 13696 *P. lanatum*: 13898 *P. elongatum*: 17143 *P. albens*: 18224 *P. aurantium*: 19907 *P. microphyllum*.
- COOPER. 508 *H. salsoloides*.
- CRUDEN. 316 *P. dichotomum*.
- CURSON. 817 *M. cerviana*.
- DIETERLEN. 617 *P. brevicaule*: 978 *M. cerviana*: 6873 *P. brevicaule*.
- DINTER. 15a *M. cerviana*: 78 *M. cerviana*: 79 *H. salsoloides*: 515 *H. salsoloides*: 516 *M. nudicaulis*: 518 *H. salsoloides*: 1005 *H. spergulacea*: 1006 *H. salsoloides*: 1010 *P. albens*: 3622 *P. scleranthoides*: 3839 *H. angrae-pequenae*: 3821, 3887, 3889 *C. grandiflorum*: 3977 *P. confertum* v. *brachyphyllum*: 4014 *P. scleranthoides*: 4074 *P. croceum*: 4180 *P. brevicaule*: 4247 *H. spergulacea*: 4689 *P. albens*: 4789 *P. scleranthoides*: 4866 *P. brevicaule*: 4869 *P. aurantium*: 5033 *P. brevicaule*: 6034 *H. salsoloides*: 6364 *H. angrae-pequenae*: 6850 *M. nudicaulis*: 7065 *P. croceum*: 7988 *P. brevicaule*: 8233 *H. spergulacea*: 8352 *P. brevicaule*: 8368, 8432 *H. salsoloides*: 8471 *H. caespitosa*.
- DREGE. 652 *P. gracile*: 852 *P. fluviatile*: 3020 *H. spergulacea*: 3022b *P. serpyllifolium*: 3023 *C. grandiflorum*: 3025 *P. confertum*: 6214 *P. subtile*: 6215 *P. Thunbergii*: 7065 *P. croceum*.
- DREGE, I. L. 906 *H. Bowkeriana*.
- DUTHIE. 818 *P. dichotomum*.
- DYER. 39 *P. trigonum*: 1468 *P. trigonum*: 1535 *H. salsoloides*: 1540 *P. trigonum*: 2109 *H. Bowkeriana*.
- ECKLON. 30 *P. fluviatile*: 484 *P. dichotomum*: 626 *P. elongatum*: 1046 *P. fluviatile*.
- ECKLON & ZEYHER. 8 *P. dichotomum*: 18 *P. lanatum*: 210 *P. dichotomum*: 63.9 *P. elongatum*: 78, *P. lanatum*: 79.4 *H. salsoloides*: 88, *H. salsoloides*: 90.9 *P. dichotomum* & *incanum*: 93.7 *P. dichotomum*: 94.12 *H. salsoloides* & *P. aurantium*: 99.12 *P. aurantium*: 1810, 1819 *P. exiguum*: 1820 *P. dichotomum*: & *fluviatile*: 1821 *P. dichotomum* & *elongatum*: 1822 *P. elongatum*: 1823, 1824 *P. lanatum*: 1825 *P. aurantium*: 1826 *H. salsoloides*: 1827 *P. lineare*: 1828 *P. fluviatile*: 1829 *P. Thunbergii*: 1831 *P. trigonum*: 2492 *P. Thunbergii*: 2493 *P. fluviatile*: 2494 *P. trigonum*: 2498 *P. dichotomum*.
- EDWARDS. 171 *P. incanum*.
- ENGLER. 6468 *M. cerviana*: 6659 *H. salsoloides*.
- ESTERHUYSEN. 808 *P. aurantium*: 809 *H. salsoloides*: 1345 *P. lanatum*: 3387 *P. lanatum*: 3478 *P. croceum*: 3490 *P. aurantium*: 4423 *P. lineare*: 4484 *P. elongatum*: 6190, 6666 *P. dichotomum*: 7309 *P. serpyllifolium*: 9051 *P. lanatum*: 12032 *P. confertum*: 12172, 14334, 15144 *P. serpyllifolium*: 17653 *P. dichotomum*: 17943 *P. albens*: 18179 *P. serpyllifolium*.
- FENCHEL. 169 *M. cerviana*.
- FLANAGAN. 84 *P. Thunbergii*: 1448 *P. brevicaule*: 1929 *P. brevicaule*: 2320 *H. Bowkeriana*: 2631 *P. dichotomum*.
- FLECK. 334a *H. angrae-pequenae*: 335a *H. salsoloides*: 358 *H. salsoloides*: 787 *M. tenella*: 804 *M. cerviana*.
- FOLEY. 65 *P. aurantium*: 2839 *M. cerviana*.

- FOURCADE. 1423 *P. dichotomum*; 1554 *P. Thunbergii*; 1664 *P. trigonum*; 1871 *P. Thunbergii*.
- FRIES, NORLINDH & WEIMARCK. 1758 *H. salsoloides*.
- GALPIN. 6632-3 *P. alpinum*; 10725 *P. confertum*; 17153 *M. cerriana*.
- GALPIN & PEARSON. 7460 *M. cerriana* v. *walteri*; 7458 *H. salsoloides*; 7483 *H. salsoloides*.
- GARSIDE. 139 *P. lineare*; 675 *P. elongatum*; 16150 *P. elongatum*.
- GERRARD. 1187 *H. Bowkeriana*.
- GERSTNER. 231 *P. trigonum*; 6327, 6359 *M. cerriana*.
- GILFILLAN. 439 *P. dichotomum*; 5524 *H. salsoloides*.
- GILL. 123 *H. salsoloides*.
- GILLETT. 4171 *P. elongatum*; 14270 *H. Bowkeriana*.
- GLOVER. 13361 *H. salsoloides*.
- GODMAN. 82 *P. elongatum*; 344 *P. elongatum*; 410a *P. lanatum*; 562 *P. confertum*; 712 *P. aurantium*; 820 *P. cordifolium*.
- GOOSSENS. 1226 *P. breicaule*; 1287 *M. cerriana*.
- GRAHAM. 569 *H. Bowkeriana*.
- GUILLARMOD. 906, 1031, 1168 *P. detonsum*.
- GUTHRIE. 39 *P. lineare*; 840, 846 *P. elongatum*; 847 *P. eriguum*; 1141, 1282 *C. semiquinquefidum*; 1355 *P. lanatum*; 3405 *C. semiquinquefidum*.
- HARVEY. 220 *P. elongatum*; 243 *P. cordifolium*; 459 *C. semiquinquefidum*; 611 *P. cordifolium*; 612 *P. elongatum*.
- HENRICI. 165 *M. cerriana*; 173 *H. salsoloides*; 2240 *P. aurantium*.
- HOBART-HAMPDEN. 14. *M. cerriana* v. *walteri*; 22. *H. angrae-pequenae*.
- HUNTER. 5. *P. albens*.
- HUTCHINSON. 612 *P. elongatum*; 637 *P. cordifolium*; 714 *P. croceum*; 3134 *H. salsoloides*.
- JOHANSEN. 4415 *P. albens*.
- JOHNSON. 744, 926 *P. dichotomum*.
- JUNOD. 511 *P. breicaule*.
- KENSIT. 4830 *P. cordifolium*.
- KERR. 3. *H. acida*.
- KIES. 262 *H. salsoloides*.
- KINGES. 1893, 2082 *H. salsoloides*; 2338 *M. cerriana*; 2799 *H. angrae-pequenae*; 3396 *P. gracile*.
- KREBS. 22 *P. dichotomum*.
- LAVIS. 20244 *C. semiquinquefidum*.
- LEENDERTZ. 1167 *H. salsoloides*; 2088 *M. cerriana*.
- LEIGHTON. 578 *P. confertum*; 1128 *P. lanatum*; 1144 *P. lineare*; 1167 *P. aurantium*; 1187 *H. salsoloides*; 21608 *P. aurantium*; 21609 *P. serpyllifolium*.
- LEIPOLDT. 275 *P. lanatum*; 695 *M. cerriana*; 983 *C. semiquinquefidum*; 3092 *P. aurantium*; 3254 *P. lanatum*.
- LEISTNER. 66. *H. salsoloides*; 120. *M. cerriana*; 302 *P. croceum*.
- LETTY. 17. *P. lanatum*; 32. *P. incanum*.
- LEVYNS. 108. *P. aurantium*; 342. *P. trigonum*; 1155 *P. aurantium*; 1196 *P. elongatum*; 1276. *P. elongatum*; 1357. *P. aurantium*; 3635 *M. pusilla*; 4349. 4709 *P. aurantium*; 7229 *P. confertum* v. *brachyphyllum*; 8042 *P. aurantium*.
- LIEBENBERG. 4628 *M. cerriana*; 5120 *H. salsoloides*.
- LINDERETH. 162 *M. cerriana* v. *walteri*.
- LONG. 218 *P. dichotomum*; 219 *H. salsoloides*.
- LUGARD. 153, 156 *M. nudicaulis*.

- MCAFEE. 1912 *M. cerviana*.
- MACDONALD. 66 *P. aurantium*: 150 *M. cerviana* v. *walteri*: 450 *H. salsoloides*.
- MACGILLIVRAY. 645 *P. elongatum*.
- MACOWAN. 739 *P. detonsum* & *dichotomum*: 819 *P. elongatum*: 2973 *P. elongatum*.
- MADER. 25 *P. confertum*: 35 *P. aurantium*.
- MAGUIRE. 940 *C. grandiflorum*.
- MARLOTH. 3317 *P. elongatum*.
- MARTIN. 6 *H. salsoloides*.
- MASKELL. 31 *H. salsoloides*.
- MOGG. 24404 *H. salsoloides*: 8765 *H. salsoloides*.
- MORRIS. 5649 *P. aurantium*: 5650 *P. albens*.
- MOSS. 2454 *P. Thunbergii*: 7028 *P. cordifolium*: 8082 *P. elongatum*: 9059 *P. lineare*: 9074 *H. arenicola*: 17854 *H. salsoloides*.
- MOSS & ROGERS. 606 *M. cerviana*: 607 *M. nudicaulis*: 1634 *P. lineare*.
- MUIR. 107 *P. fluviatile*: 1593 *P. elongatum*: 3751 *P. aurantium*.
- MUNRO. 850 *H. Bowkeriana*.
- MURRAY. 767 *H. salsoloides*.
- NATION. 304 *M. cerviana*.
- NIVEN. 35 *P. albens*.
- OLDENBURG. 1161 *P. lineare*.
- ORTENDAL. 36 *H. salsoloides*: 93 *M. cerviana* v. *walteri*.
- PAPPE. 619 *H. arenicola*.
- PARKER. 3907 *P. lanatum*: 4419 *M. cerviana*.
- PATERSON. 60 *P. dichotomum*: 787 *P. Thunbergii*.
- PEARSON. 2207 *H. salsoloides*: 3019 *H. spergulacea*: 3324, 3336 *H. salsoloides*: 3351 *P. confertum* v. *brachyphyllum*: 3398, 3402, 3412 *H. salsoloides*: 3414 *P. albens*: 3571, 3588 *H. salsoloides*: 3603 *M. cerviana* v. *walteri*: 3607 *M. cerviana*: 3699 *H. salsoloides*: 3787 *P. albens*: 4063 *H. salsoloides*: 4077 *H. spergulacea*: 4227 *P. confertum* v. *brachyphyllum*: 4236 *H. salsoloides*: 4496 *M. cerviana*: 4527 *H. salsoloides*: 4798 *M. cerviana*: 5222 *P. incanum*: 5254 *P. confertum*: 5731 *H. salsoloides*: 6033 *H. spergulacea*: 6037 *M. cerviana*: 6133 *H. spergulacea*: 6771, 6774 *P. aurantium*: 8337 *H. salsoloides*: 8577 *P. aurantium*: 8578 *M. cerviana*: 8593 *P. albens*: 8985 *H. salsoloides*: 9528 *H. salsoloides*: 9734 *H. spergulacea*: 9800 *M. cerviana*.
- PEGLER. 2019 *P. Thunbergii*.
- PERDONNET. 23 *P. dichotomum*.
- PERVILLÉ. 647 *H. suffruticosa*.
- PHILLIPS, E. P. 876 *M. cerviana*: 1754 *P. fluviatile*: 3208 *P. brevicaulis*: 4614 *P. lanatum*.
- PILLANS. 5160 *P. albens*: 5188 *H. salsoloides*: 5206 *P. microphyllum*: 5222 *P. incanum*: 5223, 5225 *P. lanatum*: 5269 *C. grandiflorum*: 5280 *M. cerviana*: 5293 *H. spergulacea*: 5326, 5380 *H. salsoloides*: 5660 *P. albens*: 6253 *P. aurantium*: 6407, 6486 *H. spergulacea*: 7974 *P. lineare*: 8613 *C. verticillatum*: 9047 *P. confertum*: 9232 *P. cordifolium*: BÖL. 18036-7-8-9 *P. microphyllum*.
- POHLE. 61 *H. salsoloides*.
- POLE EVANS. 64 *H. salsoloides*: 1885 *H. salsoloides*: 2278 *H. salsoloides*: 4551 *M. cerviana*.
- PONT. 273 *H. salsoloides*.
- POTGIETER. 25 *P. brevicaulis*: 36 *H. Bowkeriana*.
- POTT. 4546 *H. salsoloides*.
- POTTS. 2592 *H. Bowkeriana*: 2853 *H. salsoloides*: 3039 *P. dichotomum*.

- PROSSER. 1642 *H. salsoloides*.
- RAND. 75 *M. cerviana*.
- REHMANN. 856-7 *P. elongatum*; 2199 *P. lineare*; 2993 *P. dichotomum*; 3107 *H. salsoloides*; 5193 *H. Bowkeriana*.
- RAUTENEN. 149 *M. cerviana*.
- REPTON. 353 *M. cerviana*; 1334 *H. salsoloides*; 3053 *M. cerviana*.
- RODIN. 1027 *P. dichotomum*; 1473 *P. aurantium*; 2859 *H. salsoloides*.
- ROGERS. 4214 *P. dichotomum*; 5520 *H. Bowkeriana*; 6458 *M. nudicaulis*; 6859 *H. Bowkeriana*; 6895 *M. cerviana*; 11272 *P. dichotomum*; 15406 *P. detonsum*; 16158 *P. elongatum*; 16516 *P. dichotomum* & *incanum*; 16787 *P. incanum*; 17121 *H. salsoloides*; 21749 *H. Bowkeriana*; 22809 *H. Bowkeriana*; 26585 *P. elongatum*; 29032 *P. fluviatile*; 29863 *P. elongatum*; 30115 *P. elongatum*.
- SALTER. 271/4 *P. lanatum*; 271/7 *P. lineare*; 271/10, 271/13 *P. cordifolium*; 1243 *P. elongatum*; 1439 *P. confertum* v. *brachyphyllum*; 1497 *P. confertum*; 1733 *P. lineare*; 1734 *P. lanatum*; 1806, 1844 *P. cordifolium*; 3693 *P. croceum*; 3788 *H. salsoloides*; 4921 *P. lineare*; 7021 *P. lanatum*; 7811 *C. semiquinquefidum*; 8282 *P. exiguum*; 8708 *H. salsoloides*.
- SANKEY. 248 *P. brevicaulis*.
- SCHENCK. 71 *M. cerviana*; 76, 157 *H. salsoloides*; 332 *H. spergulacea*; 692 *H. salsoloides*.
- SCHINZ. 874, 875-6 *H. salsoloides*; 886 *M. cerviana*; 2058 *P. aurantium*.
- SCHLECHTER. 87 *P. scleranthoides*; 332 *P. croceum*; 454 *P. lineare*; 559, 573 *C. semiquinquefidum*; 648 *P. lineare*; 1120 *P. dichotomum* & *elongatum*; 1202 *P. exiguum*; 1205 *P. cordifolium*; 1224 *P. confertum*; 1246 *P. elongatum*; 1445 *M. cerviana*; 1743 *P. dichotomum*; 2210 *P. trignum*; 2423 *P. exiguum*; 2483 *P. dichotomum*; 4020 *P. brevicaulis*; 4245 *M. cerviana*; 4344 *H. Bowkeriana*; 4481 *P. brevicaulis*; 4932 *M. tenella*; 4981 *P. brevicaulis*; 5003 *P. lanatum*; 5032 *C. semiquinquefidum*; 5046 *M. pusilla*; 5062 *P. exiguum*; 5608 *P. dichotomum*; 5350 *P. elongatum*; 6116 *P. trignum*; 8031 *H. salsoloides*; 8137 *P. croceum*; 8193 *P. croceum*; 8224 *P. exiguum*; 8240 *M. tenella*; 8297 *P. exiguum*; 8323 *P. exiguum*; 8326 *C. grandiflorum*; 8406 *P. aurantium*; 8423 *P. exiguum*; 8566 *P. incanum*; 8631 *M. tenella*; 8664 *M. pusilla*; 8671 *M. tenella*; 8714 *M. namaquensis*; 8906 *P. lanatum*; 10114 *P. microphyllum* v. *albens*; 10226 *P. serpyllifolium*; 11088 *P. aurantium*; 11131 *P. aurantium*; 11191 *P. aurantium*; 11232 *P. croceum*; 11867 *H. Bowkeriana*.
- SCHMIDT. 269 *P. albens*.
- SCHONFELDER. S392 *M. cerviana*; S442 *M. nudicaulis*.
- SCHONLAND. 3082 *P. trignum*.
- SCHULZ. 829 *P. dichotomum*.
- SCWEICKERDT & VERDOORN. 532 *M. cerviana*; 584 *M. nudicaulis*.
- V. D. SCHYFF. 1615 *M. cerviana*.
- SCULLY. 76 *P. croceum*; 218 *P. lanatum*; 248 *P. brevicaulis*; 1160 *P. albens*.
- SHARPE. 7466 *H. salsoloides*.
- SIDEY. 501 *P. trignum*.
- SIEBER. 210 *P. elongatum*; 239 *P. lanatum*; 1239 *P. lanatum*.
- SILK. 28 *H. salsoloides*.
- SITWELL. 55 *H. salsoloides*.
- SMITH, C. A. 484, 2503, 3922, 5360 *H. salsoloides*; 5435 *M. cerviana*.
- STEPHENS. 6880 *P. elongatum*; 6883 *P. incanum*.
- STEPHENS & GLOVER. 8742 *C. grandiflorum*.

- STORY. 1104 *M. cerviana*: 2283 *H. Bowkeriana*: 2772 *P. dichotomum*: 2884 *P. trigonum*: 3082 *P. aurantium*: 4398 *P. aurantium*.
- STREY. 2090 *H. salsoloides*: 2034 *M. cerviana*.
- SUTTON. 31 *H. Bowkeriana*.
- THERON. 138 *M. cerviana*: 348 *H. salsoloides*: 639 *M. cerviana*: 1069 *P. dichotomum*: 1223 *P. Thunbergii*.
- THODE. 573 *H. salsoloides*: A655 *P. trigonum*: A1669 *H. salsoloides*: A2664 *P. trigonum*.
- TREDGOLD. 443 *P. ciliare*.
- TYSON. 7 *P. Thunbergii*: 163 *P. dichotomum*: 168 *P. Thunbergii*: 663 *P. elongatum*: 2187 *P. Thunbergii*.
- VERDOORN. 2086, 2149 *H. salsoloides*.
- WALGATE. 671, 687 *H. trachysperma*.
- WASSERFALL. 977 *P. elongatum*: 1075 *H. salsoloides*.
- WILMAN. 321 *H. salsoloides*: 708, 746 *C. grandiflorum*: 925 *P. aurantium*.
- WELWITSCH. 2381 *H. salsoloides*.
- WILMS. 3234 *P. exiguum*.
- WOLLEY-DOD. 252 *P. lineare*: 253 *P. lanatum*: 254 *P. elongatum*: 675 *C. semiquinquefidum*: 1360 *P. elongatum*: 2014 *P. cordifolium*: 2318 *C. semiquinquefidum*: 2774 *P. exiguum*: 2852 *P. cordifolium*: 2868 *P. exiguum*: 2905 *P. exiguum*: 2906 *M. pusilla*: 2907 *P. exiguum*: 3091 *P. elongatum*: 3162 *C. semiquinquefidum*: 3184 *P. exiguum*: 3261 *P. lineare*: 3376 *P. exiguum*.
- WOOD. 5484, 12686 *P. Thunbergii*.
- YOUNG. 3506 *P. dichotomum*.
- ZEYHER. 78 *P. microphyllum*: 114.10 *P. trigonum*: 484 *P. fluviatile*: 612 *P. elongatum*: 613 *M. cerviana* & *P. serpyllifolium*: 614 *P. brevicaula*: 615 *H. salsoloides*: 616 *P. scleranthoides*: 617 *P. scleranthoides*: 619 *H. arenicola*: 621 *C. semiquinquefidum*: 622 *M. cerviana*: 623 *P. lineare*: 625 *P. lineare*: 626 *P. elongatum*: 630 *C. semiquinquefidum*: 1046 *P. fluviatile*: 2493 *P. fluviatile*: 2494 *P. dichotomum*: 2495 *P. dichotomum* & *fluviatile*: 2496 *P. lanatum*: 2497 *P. elongatum*: 2498 *P. aurantium*: 2499 *P. dichotomum*: 2842 *H. salsoloides*.



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THE SOUTH AFRICAN SPECIES OF AIZOACEAE.

V. *CORBICHONIA*.

by

R. S. ADAMSON.

CORBICHONIA

Scop. Int. Nat. Hist. 204. 1777.

Axonotechium Fenzl Ann. Wien. Mus. 1: 354. 1836.

Orygia auct. plur. non Forsk. F. Aeg.—Arab. 103. 1775.

Prostrate glabrous perennial, woody at the base. Leaves alternate, without stipules. Flowers in lax terminal cymes. Perianth segments 5, free or almost so. Stamens numerous, the outer without anthers, flattened, united at the base in a cup, the inner with anthers, free or attached to the cup. Ovary superior, 5-chambered, with numerous ovules in each chamber. Stigmas 5, slender, spreading. Fruit loculicidally dehiscent. Seeds compressed, kidney-shaped, with a small fleshy aril at the top of the funicle.

The only species is *C. decumbens* (Forsk.) Exell
wide-spread in the drier parts of Africa, also in South-west Asia.

A distinctive genus both in habit and in floral structure. The flattened staminodes have been looked upon as petals and the genus associated with *Mesembryanthemum* (cf. Lindley Veg. King, ed. 2. 526. 1847) but it is usually regarded as belonging to the *Molluginaceae* (cf. Sonder Fl. Cap. 1: 136. 1860; Pax & Hoffman Eng. & Prantl Nat. Pflanzf. ed. 2. 16. c: 192. 1934; Friedrich Mitt. Bot. Munch. 12: 58. 1955).

The dehiscence of the fruit is along the midribs of the carpels. It only extends about half to two-thirds the length. The septa at the same time separate from the centre.

This monotypic genus has been named by almost all writers *Orygia* Forsk. Fl. Aeg.-Arab. 103. 1775, but, as pointed out by Exell (J. Bot. 73: 80. 1935), it diverges so much from the generic diagnosis that it cannot be retained in it. Forskal (l.c.) described two species under *Orygia* of which the first agrees with his diagnosis, but the second, this one, is so different that its inclusion is not possible.

C. decumbens (Forsk.) Exell J. Bot. 73: 80. 1935.

Orygia decumbens Forsk. Fl. Aeg.-Arab. 103. 1775.

O. mucronata Klotsch in Peters Reise Mossamb. Bot. 140. t.25. 1861.

Portulaca decumbens Vahl Symb. Bot. 1: 83. 1790.

Telinum decumbens Willd. Sp. Pl. 2: 864. 1800.

Glinus trianthemoides Hayne in Roth Nov. Sp. Pl. 231. 1821.

Telephium laxiflorum DC. Prodr. 3: 366. 1828.

Axonotrichum trianthemoides Fenzl Ann. Wien. Mus. 1: 355. 1836.

Glabrous, more or less glaucous. Stems woody at the base, up to 45 cm. long with ascending branches, the younger pale-coloured. Leaves alternate, slightly fleshy, obovate or the lower almost orbicular, the upper broadly elliptical, 1.5—4 cm. long, 0.6—2.5 cm. wide, the basal up to 6 cm. long and 3 cm. wide, entire, flat, acute or mucronate sometimes shortly apiculate, at the base narrowed to a petiole 2—5 mm. long. Inflorescences terminal on branches, forking, with 1 or 2 pseudoracemose branches 2—5 cm. long. Pedicels 0.4—0.8 cm. long. Bracts narrow boat-shaped, acute, about 3 mm. long. Perianth segments green outside, often red or purple inside, 4—6 mm. long, 2.5—3.5 mm. wide, acute or mucronate, the inner narrower than the outer. Stamens erect, the staminodes scarious, as long as or shorter than the fertile stamens: anthers buff-coloured. Ovary rounded, stigmas long. Fruit almost spherical, about as long as the perianth. Seeds brown, with a white aril.

Dry sandy or rocky places in the warmer parts. Most frequent in river beds.

The large basal leaves wither away at or before flowering time.

S.W. AFRICA. Gt. Karasberg *Pearson* 8562 (BM.K): Bothhavos *Silk* 245 (K): Springbank *Rogers* 15367 (K): Aub Riv. *Pearson* 3750, 3755 (K): Keetmanshoop *Acocks* 18104 (K).

CAPE. HAY Asbestos Mts. *Burchell* 2054 (K): Mazelfontein *Anderson* (K): Orange Riv. *Bryant* 783 (K): KIMBERLEY Modder Riv. Drift *Burchell* 1755 (K): Dutoitspan *Barker* (K): Windsorton *Marloth* 4761 (K): HOPETOWN Hopetown *Shaw* (Z): ALBERT Rhenosterkop *Burke* (K): GRAAF REINET Graaf Reinets *Bolus* 16181 (BM): *MacOwan* 426 (K): STUTTERHEIM Bolo *Acocks* 9085 (K): PONDOLAND *Bachmann* 492 (Z).

NATAL. UMZIMKULU Umzimkulu *Jacottet* (Z): UMZINTO Umkomaas *Dumisa Rudatis* 1933 (G): Skottberg *Wheeler* (Z): ESTCOURT Mooi Riv. *Wood* 881 (K), 4491 (K), 5391 (BM): ZULULAND *Gerrard* 1489 (BM.K).

TRANSVAAL. MARICO Rooiplatz *Leendertz* 782 (K): Zeerust *Thode* A1410 (K) s.l. *Louw* 1885 (K): PRETORIA Elands Riv. *Rehmann* 4901 (Z), 4951 (K.Z.): WATERBERG Springbok Flats *Galpin* M. 733 (K): *Pole Evans* 3963 (K): PIETERSBURG Shilohvane *Junod* 1338 (Z): ZOUTPANSBERG Zoutpansberg *Rogers* 21534 (K): Brak Riv. *Schlechter* 4622 (BM.G.K.Z): Messina *Rogers* 19255 (G): 19319 (Z), 21534 (Z): Dongola *Codd & Dyer* 3841 (K): Punda Maria *Codd* 5994 (K): LYDENBURG Spitzkop *Boss* (K): NELSPRUIT Komati Poort *Moss & Rogers* 679 (BM): *Pole Evans* H16911 (K): *Rogers* 20342 (G): Skukuza *Codd & de Winter* 5084 (K): BARBERTON Barberton *Rogers* 20288 (G.K.Z): Hectorspruit *Thorncroft* 1128 (BM.K): Louw's Creek *Hutchinson* 2514 (K): Piggs Peak *Thorncroft* 2255 (K).

Without locality:—*Drege* (K), *Drege* (*Senebiera aizoides*) (BM.G.K): *Sanderson* (K): *Zeyher* 993 (BM).

A NEW MARSH SPECIES OF ERICA.

by

COL. H. A. BAKER, O.B.E., M.C., Retd.

Erica riparia H. A. Baker sp. nov. (Ericaceae-Ericoideae) § Ceramia.

Planta diffusa palustris vel riparia, circa ad 1.2 m. in longitudine. *Rami* graciles rigiduli, pilis longis brevibusque admixtis induti. *Folia* ternata, 2.5 mm. longa, plana, margine revoluta, nunc ovata nunc elliptica, marginibus pilis et longis debilibus et brevissimi admixtis ciliata. *Flores* terminales, acervatim 3—12-nati, frequenter circa 6-nati. *Pedunculi* 3 mm. longi, pilis admixtis hirsuti; bractee 3, parvae ovato-lanceolatae, sub-approximatae, sicut folia revolutae et ciliatae. *Sepala* ovato-lanceolata ad lanceolata, 1.25—1.5 mm. longa, viscida, purpureo-rubra, revoluta vel plana, sicut folia ciliata et marginibus interioribus pilis paucis brevibus glandulosis induta. *Corolla* globosa 2.5 mm.—3 mm. longa, viscida, purpureo-rubra, pilis admixtis hirsuta; lobi parvi erecti obtusi. *Filamenta* complanata; antherae exsertae, 1 mm. longae, scabridae nigrae muticae, basaliter dorsifixae. *Ovarium* hispidum 2 mm. longum, 1.5 mm. latum: stylus longus, exsertus, stigmatae parvo.

A straggling marsh or streamside plant up to about 1.2 m. in length. *Branches* slender, somewhat rigid, hirsute with mixed hairs. *Leaves* 3-nate, open-backed, revolute, ovate to elliptic, ciliate on the margins with long weak hairs and very short hairs intermixed. *Flowers* terminal in clusters of from 3 to 12 flowers, commonly about 6. *Peduncles* 3 mm. long, hirsute with mixed hairs: bracts 3, small, ovate-lanceolate, sub-approximate, revolute and ciliate like the leaves. *Sepals* ovate-lanceolate to lanceolate, 1.25 to 1.5 mm. long, viscid, purplish-red, revolute or flat and ciliate like the leaves with a few short gland-tipped hairs admixed. *Corolla* globose, 2.5 to 3 mm. long, viscid, purplish-red, hirsute with rather short mixed hairs; lobes small, erect, obtuse. *Filaments* flattened; anthers exserted, scabrid, black, muticous, basically dorsifixed. *Ovary* hispid, 2 mm. long, 1.5 mm. broad: style well exserted: stigma small.

CAPE PROVINCE: Caledon Div. N.E. of Avoca, *Baker* 1163, *holotype* in Bolus Herbarium, Baviaanskloof, *Stokoe* 7464, *Baker* 1264; Bredasdorp Div.; Brandfontein, *Esterhuizen* 19090, 19107. Flowers Sept.-Oct.

This plant was collected by the author in October 1956 in tall reeds and grasses at the edge of a small stream crossing the Gaansbaai-Stanford

road just N.E. of Avoca. Only one small interwoven group of plants was found here and a search up and down the stream and in the river at the bottom revealed no more specimens. The altitude is approximately 250 ft. It has been collected twice before; by Esterhuizen (19107 & 19090) at Brandfontein in a swamp at the top of a low hill near the sea beyond Gunners' point and by Stokoe (7464) on the farm Baviaanskloof near Gaansbaai. The author also collected it near this farm (*Baker* 1264) in September 1957 in a very small seepage almost at the top of the kloof at about 1000 ft., but only in this one small area in spite of many other apparently suitable places nearby. Here there are many plants mingled with a tangle of other vegetation. It is curious that on this date the plants at the Avoca site, which is much lower, were far less advanced than those in Baviaanskloof which were at their best.

E. riparia is similar in habit to many of the marsh-loving heaths in the § *Ephebus*, many of which seem to have become isolated, each in its own individual marsh, though they all have characteristics that suggest a common origin. Although probably confined to a few damp places in the Caledon and Bredasdorp Divisions, it is not so definitely local and,



FIG. 1 -*Erica riparia* H. A. Baker (Natural Size) *Baker* 1163. Del. H. A. Baker.

apart from its habit of seeking support from the surrounding vegetation, it is not closely related to them in any way.

The specimens from the Gaansbaai district (*Stokoe* 7464, *Baker*

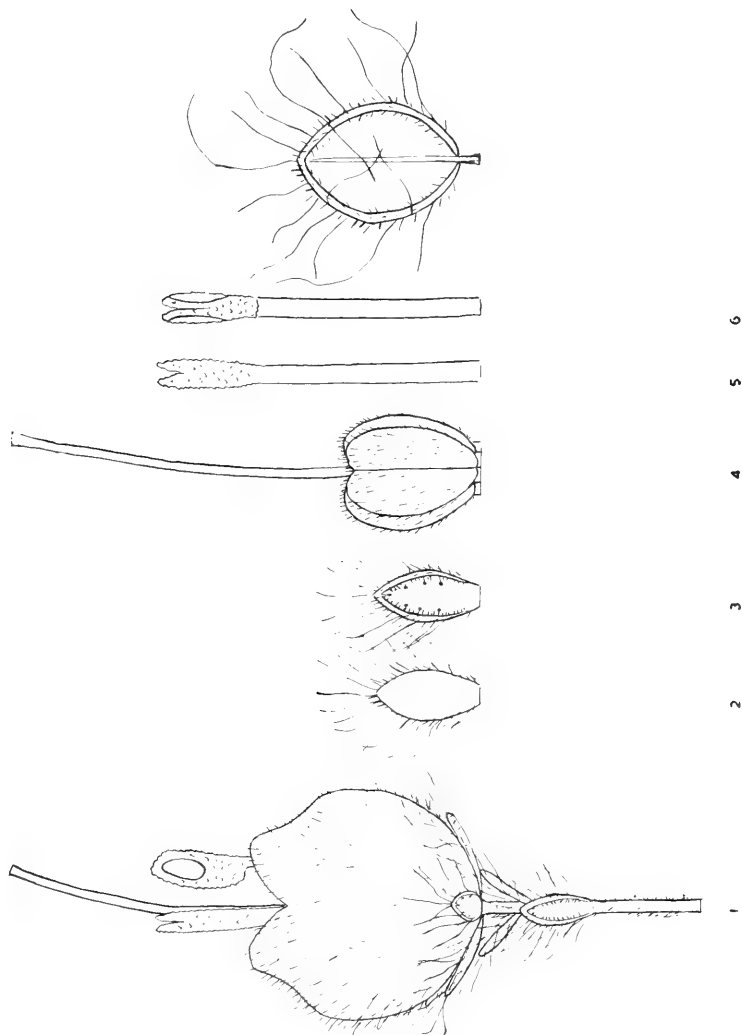


FIG. 2.—*Erica riparia* H. A. Baker. 1. flower, 2. sepal, inside, 3. sepal, outside, 4. gynoeceum, 5. anther, back view, 6. anther, front view, 7. leaf, inside view. All $\times 12$. Del. H. A. Baker.

1163 & 1264) are generally similar except that the internodes in 1264 are much closer than in 1163, possibly because the plants are not quite so overwhelmed by other vegetation and get more sun. But the Esterhuizen specimens from Brandfontein, which is 30 miles away, show signs of differentiation, e.g. (a) the sepals are lanceolate, longer and not revolute, (b) there are gland-tipped ciliate hairs on the peduncle and the bracts, (c) the filaments are broader and (d) the ovary has longer hairs.

The author would like to take this opportunity of thanking those who have, by their encouragement and assistance, made it possible for him to undertake this work. Firstly to Capt. T. M. Salter, R.N. Retd., for much valuable assistance and for doing the Latin translation and secondly to the Curators of the Bolus and Compton Herbaria and also of the South African Museum Herbarium, now lodged at Kirstenbosch, for giving me facilities for examining specimens and for access to the invaluable library in the former establishment.

SOME NOTES ON ERICA COCCINEA L. WITH A DESCRIPTION OF A NEW VARIETY.

by

COL. H. A. BAKER, O.B.E., M.C., Retd.

***Erica coccinea* L. (non Berg.) var. *inflata* H. A. Baker var. nov.**
(Ericaceae-Ericoideae) § Gigandra.

Erica coccinea L. varietas sed ita differt. *Corolla* 1.5 cm. longa, in parte inferiore valde inflata, candide fulgido-viridis et viscidissima: *pedunculi* breves, 2—3 mm. longi: *sepala*, sicut bracteae, viridia et viscida, non carinata, sed nervo medio subprominente.

*) A variety of *E. coccinea* L. but differs as follows:—*Corolla* 1.5 cm. long, very much inflated in the lower part, bright shining green, very sticky: *peduncles* short, 2—3 mm. long: *sepals*, like the bracts, green and sticky, not keeled, but with a subprominent midrib. (Fig. 1).

CAPE PROVINCE: Caledon Div.: Koude Mountains, between Gaansbaai and Elim, *Baker* 1154, *holotype* in Bolus Herbarium; *Baker* 1247: *Compton* 5643. Flowers September-October.

It may seem presumptuous to introduce a new variety into this very variable species, but this plant seems to differ so much from the other named varieties as to warrant this rank.

The plant was collected by the author in the Koude Mountains, a low ridge up to 1,500 ft. between Gaansbaai and Elim, in October 1956 and September 1957. The ridge runs roughly from S.W. to N.E. and several small valleys start near the top and run down into the river valleys at the bottom. The plant was found at the heads of two non-adjacent valleys running N.W. and, in one of them, in large numbers.

In the valley between these two there is a large colony of an entirely different variety of *E. coccinea* with small, sticky yellow flowers (*Baker* 1250) which is near var. *intermedia* Bolus. It was also found on the S.E. side of the mountain but not in large colonies. The green variety was

*The reason for reverting, under the Rules of Nomenclature, to the name *Erica coccinea* L. Sp. Pl. 1 355 (1753), the oldest name of this species, in the place of *E. Peteveri* L. Mant. Alt. 235 (1771), which has been upheld by Guthrie and Bolus in the Flora Capensis Vol. IV, § 1, 47 (1909), is given in the Journal of S. African Botany Vol. VIII, 279 (1942). No revised nomenclatural combinations for the four existing varieties of *E. Peteveri* L., in the Flora Capensis, have yet been published under *E. coccinea*.

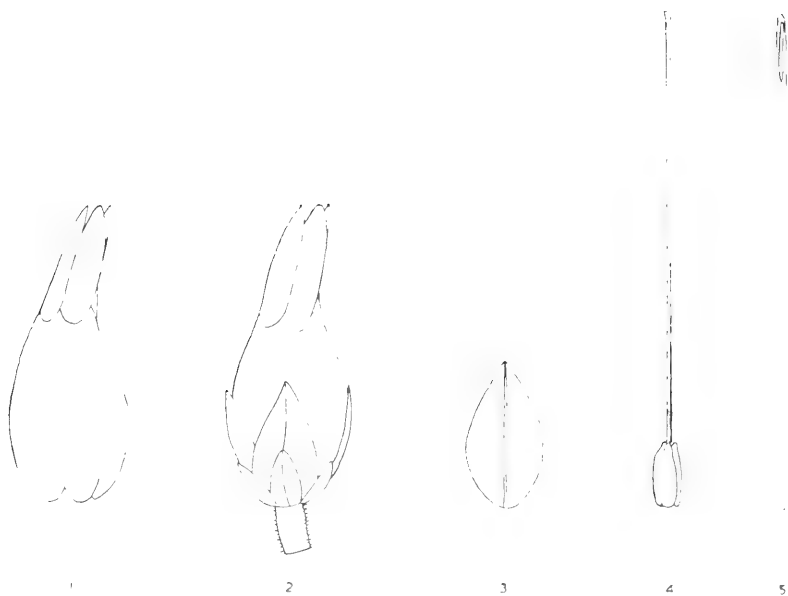


FIG. 1. *Erica coccinea* L. var. *inflata* H. A. Baker. (Baker 1154.)

1, corolla, 2, flower, 3, sepal, 4, gynoecium, 5, stamen. All $\times 3$. Del. H. A. Baker.

found only in the two valleys on the N.W. side. From a study of the specimens of var. *intermedia* in the Bolus Herbarium and the description of *Erica intermedia* Kl. in de Candolle Prodr. VII. 621. on which it is based, it would appear that this variety is in itself quite variable in different localities. Perhaps this is not surprising since even the typical form of *E. coccinea* varies in degree of stickiness, hairiness of bracts and sepals, length of peduncle, presence or absence of keels on the bracts and sepals and colour of the corolla: but in spite of this it is readily recognised as *E. coccinea*. What seems more strange is that the different varieties are often found in the same area. Baker 1250, though it differs in several respects from the typical specimens of var. *intermedia* from the Robinson Pass, Mossel Bay Division, is considered to be only a local form. A plant similar to it was collected by Esterhuizen (19169) in October 1951 on the top of Bredasdorp Mountain, which is not far away.

For comparison drawings are included of (a) *E. coccinea* L. var. *inflata* H. A. Baker (Fig. 1), (b) Baker 1250, referred to above (Fig. 3), (c) a

typical var. *intermedia* from Robinson Pass, *Salter* 3258, (Fig. 4), (d) a specimen, *Stokoe* 2626, in which the flowers are very small with a corolla disproportionately short, borne in pairs or ternate, (Fig. 5) and (e) a typical *E. coccinea* L., yellow-flowered form, *Baker* 1162, from the Koude Mt. area (Fig. 2).

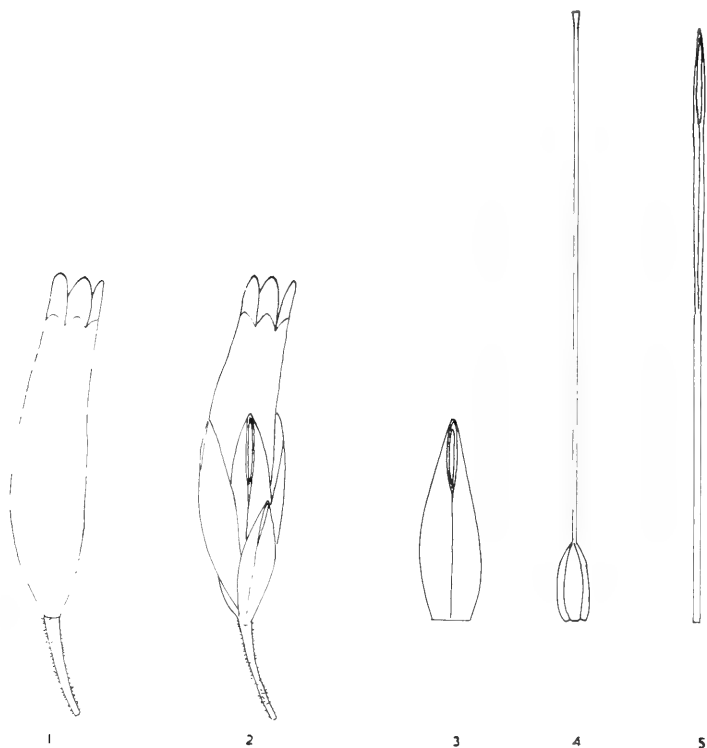


FIG. 2. *Erica coccinea* L. (Baker 1162.)

1. corolla, 2. flower, 3. sepal, 4. gynoecium, 5. stamen. All $\times 3$. Del. H. A. Baker.

It is not known how widely var. *inflata* is distributed, but it has only been recorded once before by Professor Compton from a specimen on show at the Caledon Flower Show (*Compton* 5643) and now in the Bolus Herbarium. Two somewhat similar specimens collected by Stokoe from the Klein River Mountains (*S.A. Museum* 65378) and on the Springfield estate near Bredasdorp (*S.A. Museum* 62725), both in the Compton

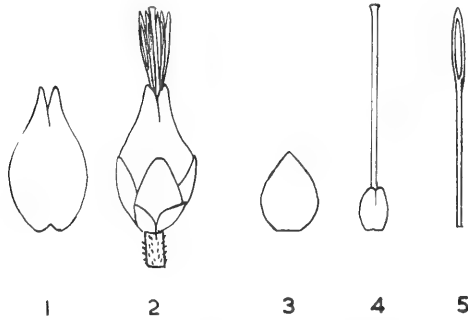


FIG. 3, *Erica coccinea* L. var. *intermedia* Bolus. (Baker 1250.)

1. corolla, 2. flower, 3. sepal, 4. gynoecium, 5. stamen. All $\times 3$. Del. H. A. Baker.

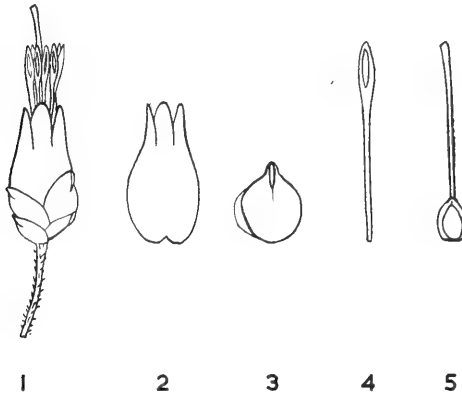


FIG. 4, *Erica coccinea* L. var. *intermedia* Bolus. (Salter 3258.)

1. flower, 2. corolla, 3. sepal, showing outgrowth of sepal where underlapping the next sepal, 4. stamen, 5. gynoecium. All $\times 3$. Del. H. A. Baker.

Herbarium, may be the same var. but, as there is no note as to stickiness or colour, this is not certain, but on general similarity it seems likely. At any rate, it seems probable that it is confined to the Caledon and Bredasdorp Divisions and not of frequent occurrence.

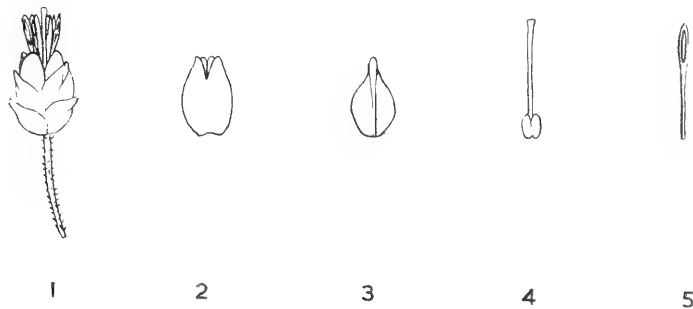


FIG. 5. *Erica coccinea* L. var. *intermedia* Bolus. (Stokoe 2626.)

1. flower, 2. corolla, 3. sepal, 4. gynoecium, 5. stamen. All $\times 3$. Del. H. A. Baker.

NINTH INTERNATIONAL BOTANICAL CONGRESS.

NOMENCLATURE SECTION.

DATES

The delegates to the Nomenclature Section of the Ninth Congress will be welcomed in Montreal at 10 a.m. on Sunday, August 16, 1959, at a brief meeting. The rest of that day will be devoted to meetings of the Nomenclature Committees. The main Nomenclature Session will start on Monday morning, August 17, and end on the afternoon of August 19. Dates for the Congress itself are August 19 to August 29, but August 19 is reserved for registration.

BUREAU OF NOMENCLATURE.

President: J. ROUSSEAU, National Museum of Canada, Ottawa, Canada.

Vice-president: R. C. ROLLINS, Gray Herbarium of Harvard University, 22 Divinity Ave., Cambridge 38, Mass.— U.S.A.

Recorder: B. BOIVIN, Botany and Plant Pathology Division, Science Service, Dept. of Agriculture, Ottawa, Canada.

Rapporteur-général: J. LANJOUW, I.A.P.T., Lange Nieuwstraat 106, Utrecht, Netherlands.

Vice-Rapporteur: F. A. STAFLEU, I.A.P.T., Lange Nieuwstraat 106, Utrecht, Netherlands.

PROPOSALS.

Proposals regarding the International Code of Botanical Nomenclature (1956) must be submitted to the Rapporteur-général, Dr. J. Lanjouw, before 1 September 1958. All proposals will be published in *Taxon*.

The nomenclature proposals will be presented to the Congress by the Rapporteur-général, in a "Synopsis of Proposals" to be published in December 1958.

OFFICE OF THE RAPPORTEUR.

International Bureau for Plant Taxonomy and Nomenclature, Lange Nieuwstraat 106, Utrecht, Netherlands. *All proposals on nomenclature should be sent to this address.*

STUDIES IN SOUTH AFRICAN RICCIACEAE.

III. A NEW SPECIES OF OXYMITRA.

by

S. GARSIDE.

(*Bolus Herbarium, University of Cape Town*).

Dr. T. R. Sim (1926) in "The Bryophyta of South Africa" did not record any species of *Oxymitra* from South Africa, and it was almost ten years after the publication of his work that Dr. A. V. Duthie (then working on the South African Ricciaceae) identified as *Oxymitra*, the first specimens of this genus to be discovered in this region.

These were collected by Miss D. M. Gemmell and Dr. Lutjeharms near Bloemfontein in June 1938 and Dr. Duthie made some notes and drawings from this material but for various reasons was unable to complete the work and the specimens were passed on to the present writer for further study.

Recently, as recorded below, Dr. E. Schelpe has again collected the same species in a very favourable condition of development, so that additional drawings could be made from living material. All drawings, photographs and specimens are in the Bolus Herbarium.

***Oxymitra cristata* Garside, sp. nov.**

Monoica. Frondes caespitosae confertae, intense virides, integrae vel furcatae, apice rotundatae: squamae ventrales biseriatae, atro-violaceae vel basin versus gradatim hyalinae. oblique triangulares, magnae, denseque imbricatae, apice longe cuspidatae, margine frondis bene superantes, in apice frondis hamatim incurvae.

Stomata simplicia a 5—4—6 cellulis parietibus radiantibus parum incrassatis cincta.

Antheridia in pulvillos medianos lineares, ostiolis longe eminentibus basi minute bracteatis atque cum aetate purpurascentibus.

Archegonia ante antheridia posita, in serie unica lineari disposita atque in involucri connata immersa, cristam medianam prominentia crenatam formantia. Bractae desunt.

Sporae angulares nigrescentes, 100—115 μ in maximo diametro: ala angusta usque ad 5 μ lata, margine integra vel crenata: exterior facies irregulariter reticulata, interiores facies laeves.

Type in Herb. Bolus, Schelpe 5900, Duthie 5531.

Duthie. 5460. Eagles Nest. Bloemfontein. O.F.S. Leg. Miss Gemmell and Dr. Lutjeharms. "On ironstone kopje, in shelter of grass and boulders". June 1938.

Duthie 5501. Near Hillandale. Bloemfontein. O.F.S. Leg. Miss Gemmell. April. 1939.

Duthie 5531. Groenwater Valley, E. Postmasberg, Hay, Griqualand West, Cape Province. Leg. O. L. Cooke, April 1942.

Schelpe 5900. Near Bredby Mine (25 miles S. of Kuruman) Cape (Central) Province. 4,800 ft. "Locally common in moist crevices of ironstone cliffs". April 1956.

There are only two previously described species of this genus.

They are *O. paleacea* Bisch. from the Mediterranean region, North Africa and Brazil, and *O. androgyna* Howe, from North America (Texas). The first is dioecious and the female plant has each archegonium surrounded by its own pyramidal involucre, the numerous involucres being arranged in two rows along the median line and accompanied by numerous bracts; the second species is monoecious, the archegonia have similar involucres but these are mixed with antheridia and bracts.

K. Müller (1952) has placed the latter species as a synonym of *O. paleacea*, because K. Györfy (1926) has maintained that *O. androgyna* (which also occurs in many parts of Europe) is only a monoecious form of *O. paleacea*. The latter species is therefore widely spread in the northern hemisphere and South America.

The new species from South Africa differs in a remarkable way from both the above, in having, when the thallus is mature, the archegonia in a single row in the median line covered by a continuous mass of tissue which may be regarded as being composed of the fused involucres of the archegonia, the entire group of archegonia thus being hidden in a crest-like elevated ridge, the length of this crest depending upon the number of archegonia produced. (Fig. 1 A).

Immediately behind this crest, the ostioles of the antheridia project from a median pulvinus (A), and they lead to the cavities in the thallus in which the antheridia are embedded (C).

Compared with *O. paleacea* and *O. androgyna*, there is a notable absence of bracts in the vicinity of the sexual organs, the only traces of these being the very short scales composed of a few cells each, which are to be found at the bases of the ostioles (C.).

These bracts, as well as the ostioles become deep purple with age. The colour of the general surface of the thallus is a dark green, and when the plant is fresh this contrasts strikingly with the purple-black colour of the ventral scales (D) which curve over the thallus apex and often over the thallus margins.

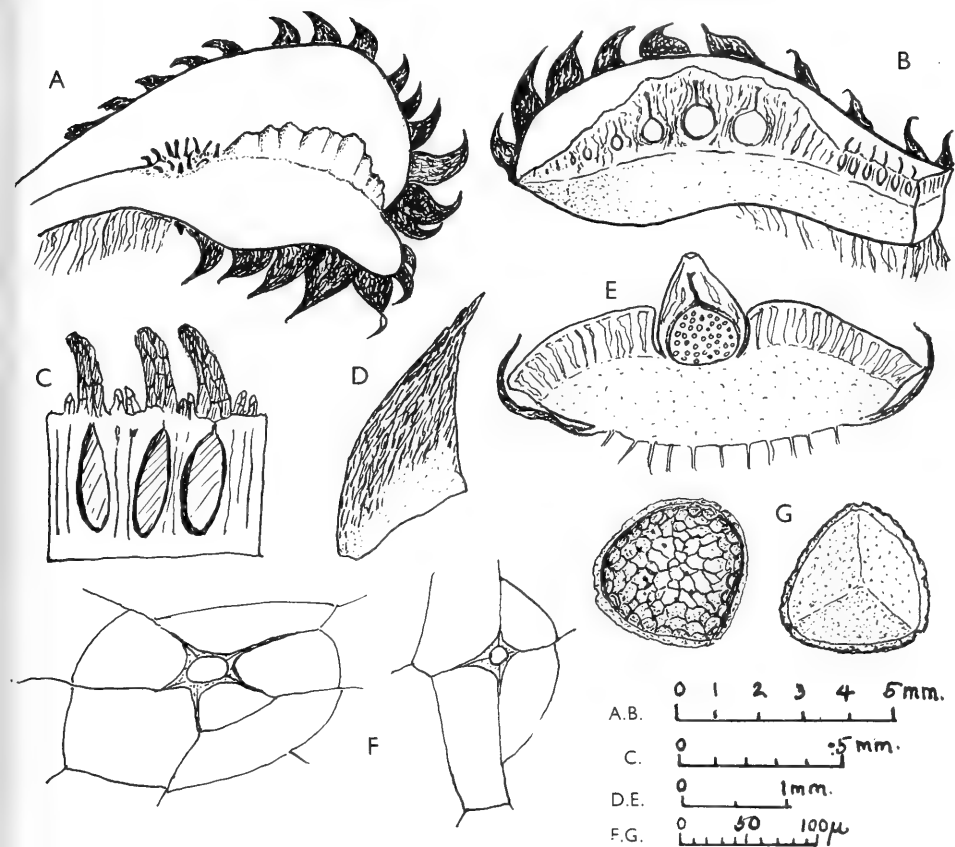


FIG. 1. *Oxymitra cristata* Garside.

- A. Thallus with antheridia and archegonia.
- B. Section of thallus along the median line.
- C. Section of antheridial group showing ostioles and bracts.
- D. Ventral scale.
- E. Transverse section of thallus through the archegonial region.
- F. Two air-pores.
- G. Spores; left, the outer face; right, the inner faces. (A to F drawn from Schelpe No. 5900; G from Duthie No. 5531.)

The air-pores of the upper epidermis are usually surrounded, each by 4 cells, 5 or 6 cells being rarely found. The radial walls of these cells are slightly thickened in the region of the pore itself, giving it a stellate appearance (F).

The archegonia are in a single line, each in a flask-shaped cavity which opens on the ridge of the archegonial crest. They have long necks which become deep purple with age (B and E).

The spores are black, opaque, and somewhat angular, with smooth inner faces separated by a slight tri-radiate marking (G, right).

The exterior (convex) face (G, left) has an irregular reticulum of about 10 areolae across the diameter, the areolae tending to elongate towards the periphery and having irregularly thickened walls. The reticulum is often incomplete in smaller spores and papillae are not developed. The narrow margin or wing of the spore may have its outer edge entire or slightly crenate. Germination of the spore has not been observed.

The thallus when dry becomes incurved, exposing only the large purple scales of the ventral surface, and the plant seems capable of undergoing long periods of drought in this state, and recovering again when moistened. All the specimens examined had been growing on red-brown clay soils, evidently containing much iron.

The detailed geographical distribution is not yet completely known. The few localities from which the plant has been obtained are very centrally situated in South Africa, all are at moderate altitudes (3,500—4,500 ft.), and have an average yearly rainfall of 15—25 in. of which 76—85 per cent. occurs during the summer months. Thus the growing season of the plant is probably from December to April, spores being mature in the latter month.

It appears that there is still some doubt if the name *Oxymitra* Bisch. (1889) is to remain valid, as opposed to *Oxymitra* (Blume) Hook. et Thomas (1855) for a genus of Anonaceae which was originally published by Blume in 1828 as a section of *Polyalthia*.

The generic name *Pycnoscenus* Lindb. (1863) is available if *Oxymitra* is not conserved for a liverwort genus (Little, 1949), in which case *Oxymitra cristata* Garside becomes *Pycnoscenus cristatus* (Garside) Garside.

The distinctive crest-like archegonial involucre of *O. cristata* will necessitate some modification of the generic characters usually given for *Oxymitra*. All previous authors have stressed the condition of having a conical or pyramidal involucre with air-chambers and air-pores around each archegonium. Thus Stephani (1898) (under the synonym *Rupinia* Corda) says:—"Archegonia seriata, singula involucro spongioso, conico-cylindrico, apice aperto circumvallata".

Indeed, when K. Müller (1940) made a new family, Oxymitraceae,

for this single genus, he still retained this feature as a family character.

O. cristata has neither separate involucre nor scales at the base of the crest-like female involucre, so that in future these characters will have to be regarded only as specific characters, because in all other respects *O. cristata* is a typical *Oxymitra*, and there can be no question of making it the type of a new genus.

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SKIATOPHYTUM L. BOL.: 'N MORFOLOGIES-TAKSONOMIESE STUDIE.

Deur O. A. LEISTNER.

(*Afdeling Plantkunde, Kimberley.*)

(Gebaseer op 'n verhandeling ingelewer ter verkryging van die M.Sc.-graad in Plantkunde aan die Universiteit van Stellenbosch, November 1954.)

INLEIDING.

Skiatophytum L.Bol. is 'n genus van die *Mesembryanthemeae* (*Aizoaceae*). Dit is endemies in die suidwestelike Kaapprovinsie.

Die algemene opvatting is dat die genus monotipies is met *S. tripolium* (L.) L.Bol. as enigste species. G. Schwantes het hierdie opvatting in twyfel getrek en het aan die hand gegee dat die soort deurtastend ondersoek moet word.

Met hierdie doel en om 'n beter insig in die genus en die familie te verkry, is hierdie studie onderneem.

Tydens die ondersoek is 'n groot reeks lewende en gedroogde materiaal uit verskillende dele van die ariaal van die genus bestudeer.

Graag wil ek my opregte dank uitspreek aan prof. dr. P. G. Jordaan van die Universiteit van Stellenbosch, prof. dr. G. Schwantes van Kiel, mnr. H. Herre en mnr. H. Meyer, albei van die Botaniese Tuin, Stellenbosch, dr. L. Bolus, die Direkteur van die Kew Herbarium en die kuratore van die Naturhistoriska Riksmuseet, die Sloane Herbarium en die Fielding Herbarium.

VARIASIE.

Tydens 'n studie van gekweekte materiaal is SCHWANTES (ongepubliseerd) getref deur die groot variasie in die genus en het die mening uitgespreek dat dit nie as monotipies beskou kan word nie.

Hy het opgemerk dat sekere eksemplare groter blomme dra as ander aan hom bekende plante van die geslag.

Gedurende hierdie ondersoek is *Mesembryanthemeae* gevind wat uiterlik groot ooreenkomste toon met die genus onder bespreking en wat gekenmerk word deur besonder groot blomme. Hierdie plante is in 'n aparte nuwe geslag geplaas wat binnekort gepubliseer sal word. Materiaal van hierdie groep is aan SCHWANTES gestuur. Hy het vasgestel dat

dit volkome ooreenstem met die grootblommige eksemplare wat hy oorspronklik as behorende tot *Skiaephytum* beskou het.

Verder is daar volgens SCHWANTES sekere plante waarvan die blomme na bestuiwing positief geotroop word. Die eksemplare wat deur DILLENIIUS (1732) afgebeeld is, toon volgens SCHWANTES ook hierdie eienskap.

Tydens hierdie ondersoek is nie 'n enkele eksemplaar gevind wat geotrope blomme besit het nie. Dit kon egter vasgestel word dat die ou blomme en veral later die vrugte deur hulle eie gewig na die grond sak. Na bevrugting vind baie keer nog 'n verlenging van die vrugsteel plaas. Dit geskied egter eweredig dwarsdeur die steel en kan dus geen geotrope groei van die vormende vrug veroorsaak nie.

Laastens is SCHWANTES van mening dat in die genus onder bespreking regopgroeiende en liggende vorms onderskei kan word.

Alle eksemplare wat tydens hierdie studie ondersoek is, was rosetplante wat in die oksels van hulle blare eenjarige stingels gevorm het wat liggend en sappig was. Regopgroeiende plante wat tot hierdie genus behoort, is dus nooit gesien nie.

Met die vergelyking van eksemplare uit verskillende dele van die areaal was dit opvallend in hoe 'n groot mate hulle sowel morfologies asook anatomies ooreengekom het. Slegs ten opsigte van die grootte van sekere organe, veral die blomme, is 'n mate van variasie vasgestel.

Alle plante wat in die natuur aangetref is, het onder feitlik identiese toestande gegroei en geen ekologiese vorms kon onderskei word nie.

Alle bekende eksemplare van die genus onder bespreking word dus beskou as behorende tot een soort, naamlik *S. tripolium* (L.) L.Bol.

ORGANOGRAFIE.

Hieronder word enkele morfologiese aspekte bespreek wat nie in die taksonomiese beskrywing genoem word nie.

Wortelspruit: Uit knoppe op wortels wat dig onder die oppervlakte groei, kan wortelspruite ontwikkel. Aanvanklik eindig hulle in twee kort, vlesige blare en is kleurloos en met skubbe bedek. Later word hulle as deur 'n laag kurk omsluit en die skubbe val af. Uit die punt van die wortelspruit ontwikkel 'n normale blaarroset. Die spruite is kort en geen eksemplaar langer as 5 cm. is waargeneem nie. Die wortelspruite vorm, sover bekend, geen wortels nie en dien dus blykbaar nie vir vegetatiewe voortplanting nie.

Blaarstand: Die blare is in 'n min of meer duidelike 2/5-spiraal gerangskik. In die blaarrosette op die oorblywende stingels word die spiraal moeilik bepaal. Op die eenjarige stingels is die blare soms skynbaar

teenoorstandig omdat die lit tussen twee agtereenvolgende blare nie verleng nie. Die blare van so 'n blaarpaar ontstaan egter na mekaar en by noukeurige ondersoek kon altyd vasgestel word dat een blaar effens hoër as die ander ingeplant is.

Blom: Die blomme word een-een aan die punte van die hoofas en sytakke van die eenjarige stingels gedra. Geen hoogteblare kan onderskei word nie. Die spiraal waarin die kelkblare gerangskik is, is 'n direkte voortsetting van die spiraal van die loofblare. Die kelkblare, kroonblare, staminodia en meeldrade is op 'n kort asbeker ingeplant.

Saadknop: Die saadknoppe is amfitroop (omskrywing van GOEBEL, 1923). Hulle word op 'n lang naelstring gedra en besit twee integumente. Die mikropiel word slegs deur die opgeswelde punte van die binneste integument gevorm. Die buitenste integument is duidelik korter as die binneste.

Vrug (Fig. 1): Na bestuiwing kan die blomsteel nog aansienlik verleng. Die vrugstele is dus gewoonlik langer as die blomstele. Die vrug is 'n doosvrug wat in sy vorm min of meer ooreenstem met die vrugbeginsel maar wat laasgenoemde in grootte oortref. In die rypwordingsproses droog die vrug volledig uit en die bokant daarvan word duidelik keëlvormig.

Die ryp vrug bars oop deurdat die driehoekige kleppe (Fig. 1, k), wat gesamentlik die keëlvormige top van die vrug gevorm het, van mekaar

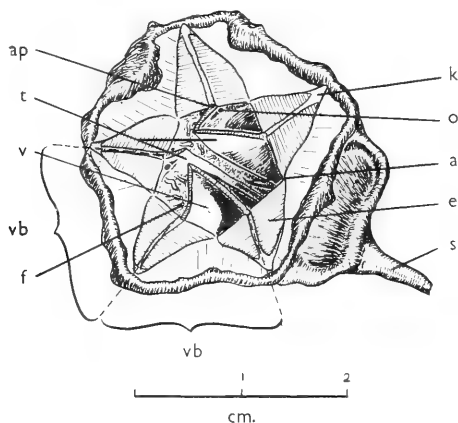


FIG. 1. Ryp, oopgebarste vrug van *S. tripolium*.

a, as; ap, aanhegtingspunt van tussenskot; e, endokarp; f, funikulus; k, klep; o, opening van saadsakkie; s, vrugsteel; t, tussenskot; v, vrughok; vb, vrugblaar.

losskeur en ver terugbuig. Hulle bly in hierdie posisie en die vrug sluit nie weer nie. Die aantal kleppe kom ooreen met die aantal vrugblare waaruit die vrug opgebou is.

Die vrughokke (Fig. 1, v) word elk gevorm deur een vrugblaar (Fig. 1, vb). Die vrug is hoksplitsend. Gevolglik bars die kleppe langs die middellyn van die vrughok oop en die mediaan van elke klep stem ooreen met 'n tussenskot (Fig. 1, t). Elke klep is dus saamgestel uit twee helftes wat afkomstig is van naburige vrugblare.

Die vrughokke is aan hulle binnekant volledig uitgevoer met 'n dun, perkamentagtige laag wat as endokarp bestempel kan word. Hierdie endokarp bestaan uit een laag selle met verhoude, gekartelde wande en oortrek die bodem en die wande van die vrughok asook die twee helftes van die twee kleppe wat gesamentlik die vrughok bedek. Solank die vrug toe is, is die endokarp op die tussenskotte feitlik aaneenlopend met dié op die kleppe. Net op die plek waar die tussenskot teen die klep raak, is die endokarp onderbreek.

Op elke klep van 'n oopgebarste vrug is twee aparte stukke endokarp sigbaar (Fig. 1, e). L. BOLUS (1928) het hierdie endokarpstukke as „broad, horny keels” beskryf. („Keel” of „kiel” is terme wat algemeen gebruik word vir die higroskopiese kiele wat die oop- en toegaan van die meeste vrugte van die *Mesembryanthemae* teweeg bring.)

STRAKA (1955) bestempel die endokarplae op die kleppe as „Quellflächen” (swelvlakke). Hierdie vlakke bewerkstellig volgens STRAKA die oopbars van die vrug deurdat hulle 'n enkele keer onder vogtige toestande uitsit. As die vrug eenmaal oop is, behou die swelvlakke hulle nuwe vorm en word nie meer beïnvloed deur vogtigheid nie. Sodoende bly die vrug permanent oop.

Die vrugte bars oop op warm, droë dae vanaf November tot Januarie. Onder eksperimentele toestande het 'n droë atmosfeer die oopgaan van vrugte bevorder terwyl vogtigheid dit sterk vertraag het. Daar word gevolglik aangeneem dat die endokarp op die kleppe nie soos in die meeste ander vrugte van *Mesembryanthemae* tot higroskopiese kiele gewysig is nie.

Die tussenskotte in die vrug (Fig. 1, t) staan keëlvormig bo die vlak uit waarop die kleppe ingeplant is. Die tussenskotte bestaan elk uit twee endokarplae van naburige vrughokke wat deur uitgedroogde parenchymatiese weefsel aanmekaar gehou word. In die middel van die vrug is die tussenskotte gewoonlik los van mekaar en daar is dus in die ryp vrug feitlik geen tekens meer van 'n deurgaande sentrale as nie. In Fig. 1 is die tussenskot op linkerhand heeltemal los van die ander terwyl die orige vier tussenskotte twee-twee in die middel van die vrug aan mekaar vas is. Die asweefsel wat in die vrugbeginsel deurgaans parenchymaties

is, droog totaal uit en is soms nog as 'n swart, draadvormige struktuur in die middel van die vrug sigbaar (Fig. 1, a).

Aan die basis van elke klep is 'n gedeelte van die vrugwand verhout. In die middel van hierdie verhoutte stuk is die boonste gedeelte van die tussenskot vasgeheg. Aan weerskante van die aanhegtingspunt (Fig. 1, ap) is 'n opening (Fig. 1, o) wat lei na 'n sentrale holte in die genoemde verhoutte stuk van die vrugwand. In hierdie holtes wat SCHWANTES (1951) „Samentaschen” (saadsakkies) noem, word daar gewoonlik 'n enkele saad aangetref. (Die ontstaan van die saadsakkies word kortliks by die ontogenie van die blom beskryf). Die opening van die saadsakkies is klein en die ingehokte sade kom eers vry nadat die verhoutte vrugwand-gedeelte verrot het. Hierdie verrottingsproses duur onder normale toestande minstens een tot twee jaar.

SCHWANTES (1929) het vir die eerste keer waargeneem dat by die vrugte van sowel *Skiatophytum* asook dié van 'n paar ander *Mesembryanthemeae* sade in holtes in die vrugwand voorkom. Hierdie verskynsel het hy „Paraspermie” genoem.

SCHWANTES (1951) meen dat die vrugte van *Skiatophytum* betreklik maklik in deelvuggies uitmekaar val. So 'n opsplitsing van vrugte is nog nie waargeneem nie. Eers in die laaste stadia van verrotting val die vrug in stukke uitmekaar waarvan die vyf verhoutte gedeeltes met die saadsakkies daarin die grootste en mees permanente is.

SAAD EN ONTKIEMING.

Die rooibruin tot swart sade is niervormig en is meestal effens langer as 2 mm. Hulle is lateraal afgeplat. Die mikropiel en die hilum lê direk by mekaar en wel op die een pool van die saad. Die saadhuid bestaan uit drie lae selle. Die buitenste laag word gevorm deur groot, dikwandige, horlosieglasvormige selle wat tannienverbindinge bevat. Die twee binneste lae is dun en hulle selwande is effens verhout. Die saad word bedek deur 'n kutikula.

Die hele embrio is oortrek met 'n dun, deurskynende vliesie bestaande uit dunwandige reghoekige selle. Dit is 'n oorblyfsel van die feitlik opgebruikte endosperm. HUBER (1924) het by alle *Mesembryanthemeae* wat hy ondersoek het, gevind dat hierdie endospermvliesie slegs die kiemworteltjie bedek. Hierdie waarneming kan nie op die sade van *Skiatophytum* toegepas word nie. Die binneste dun laag van die saadhuid wat moontlik met die endosperm verwar kan word, vorm egter in die sade van die genoemde genus 'n mussie rondom die kiemworteltjie.

Die grootste gedeelte van die saad is gevul met 'n wit, melerige perisperm. Dit bevat groot hoeveelhede van besonder klein setmeel-

korrels. Die perisperm omsluit die embrio volledig behalwe op die plek waar die kiem met sy omringende endospermlaag in kontak met die saadhuud is.

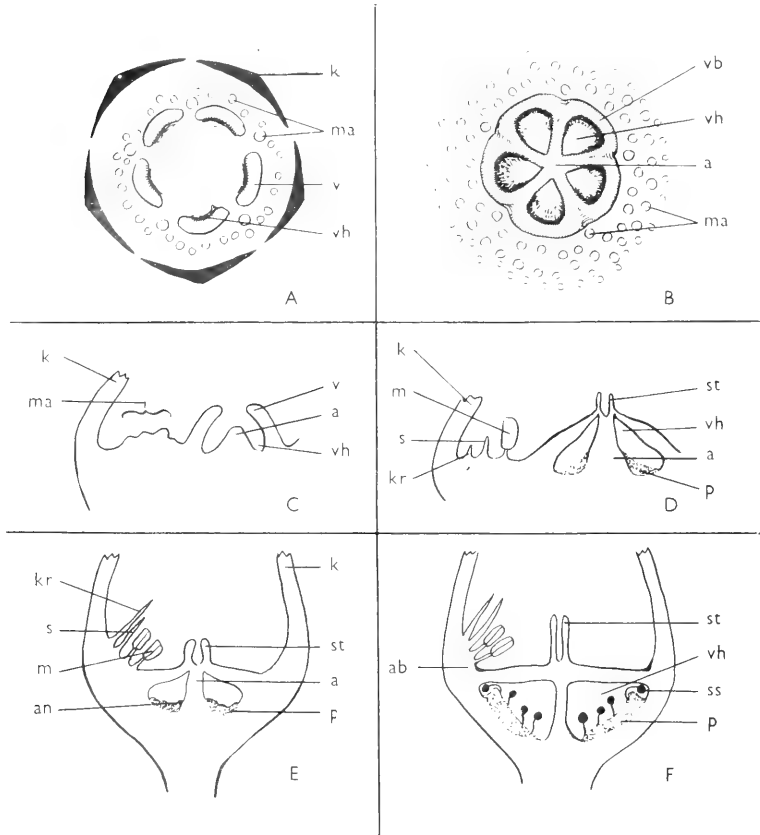


FIG. 2. Stadia in die blomontogenie van *S. tripotium*:

A. Vegetasiepunt van jong blomknop van bo; kelkblare skematies.

B. Soos A, op later stadium met stervormige vrugbeginselanlage.

C. Lengtedeursnee deur blomknop op effens later stadium as B.

D. Soos C, op later stadium; vrugbeginsel nog bostandig.

E. Soos D, op later stadium; eerste saadknopanalages op plasenta.

F. Soos E, blomknop amper volwasse; vrugbeginsel onderstandig.

a, as; an, anlage van saadknop; k, kelkblaar; kr, kroonblaar; m, meeldraad; ma, anlage van meeldraadkrans; p, plasenta; s, staminodium; ss, saadknop in saadsakkie; st, stempel; v, vrugblaar; vb, anlage van vrugbeginsel; vh, vrughok.

Saailinge is verskeie kere in die veld gevind en wel vanaf Februarie tot Mei. Die kiemkrag van sade wat uitgesaai word, is egter baie laag. Deur die sade met 5—30% swaelsuur te behandel, is ontkieming nie bevorder nie. Sade wat vir 4—5 uur met 'n 50% KOH-oplossing behandel is, het na enkele dae normaal ontkiem.

ONTOGENIE VAN BLOM.

(Fig. 2)

Kelk: Die vyf anlages van die kelkblare ontstaan na mekaar en wel in sulke posisies dat hulle die 2/5-spiraal waarin die loofblare gerangskik is, voortsit. Volgens HUBER (1924) ontstaan die „blomdekblare” (kelkblare) van die *Mesembryanthemae* uit twee verskillende blaarkranse. HAGEN (1873) en WINKLER (1957) het by die deur hulle ondersoekte soorte vasgestel dat die kelkblare soos by *Skiatophytum* in 'n 2/5-spiraal gerangskik is.

Meeldraadkrans: Sodra die blomvegetasiepunt volledig deur die kelkblare bedek word, ontstaan daarop gelyktydig vyf meer of minder duidelike heuweltjies wat met die kelkblare afwissel. Op hierdie heuweltjies ontstaan die eerste anlages van die meeldraadkrans. Die ontwikkeling van anlages vind later ook in die sektore van die kelkblare plaas tot uiteindelik 'n breë kring van meeldraadanlages gevorm word (Fig. 2, B, ma). Op hierdie stadium lyk alle anlages nog eenders en dit is onmoontlik om te sê watter van hulle oorsprong sal gee aan meeldrade, staminodia of kroonblare. Die ontwikkeling van die anlages vind progressief van binne na buite plaas. Die binneste ontwikkel tot meeldrade en die buitenste tot kroonblare terwyl die anlages tussenin tot lynvormige staminodia ontwikkel (Fig. 2, D, m, kr, s).

Met die verloop van die blomontwikkeling word die vegetasiepunt aansienlik breër en die perifere gedeeltes daarvan word opgestoot tot 'n kort asbeker (Fig. 2, F, ab) waarop die kelkblare ingeplant is. Met hierdie weefselverskuiwing word ook die meeldrade, staminodia en kroonblare uit hulle horisontale posisie verplaas en kom uiteindelik op die binneward van die kort asbeker te staan.

Vrugbeginsel: Feitlik gelyktydig met die eerste meeldraadanlages word rondom die senter van die blomvegetasiepunt, wat intussen plat geword het, vier tot sewe tangensiaal verlengde bultjies gevorm. Hierdie bultjies (Fig. 2, A, v) is die anlages van die vrugblare. Met hulle verdere ontwikkeling word die groei van hulle adaksiale kante gestrem. Gevolglik ontstaan aan die binnekant van elke vrugblaaraanlage 'n holte, die anlage van die vrughok (Fig. 2, A, vh). Die vrugblaaraanlages vou nou toe deurdat hulle rande sentripetaal verleng en in die middel van die vegetasiepunt

met mekaar vergroei. By die punt waar hulle verenig ontstaan die anlage van die sentrale as (Fig. 2, B, a). Op hierdie stadium het die vrugblaar-anlages ook lateraal met mekaar vergroei en vorm nou gesamentlik die anlage van die vrugbeginsel (Fig. 2, B, vb).

Die perifere gedeeltes van die vrugbeginselanlage begin nou baie vinniger ontwikkel as die sentrale deel. Hulle groei opwaarts en terselfder tyd sentripetaal in die rigting van die as wat intussen ook verleng het (Fig. 2, C, a). Uiteindelik ontmoet hulle in die senter van die vrugbeginselanlage waar hulle met mekaar en met die as vergroei. Vanaf die plek waar hulle met mekaar versmelt, groei elke vrugblaar uit tot 'n elsvormige struktuur wat later tot 'n stempel ontwikkel (Fig. 2, D, st). Deurdat die laterale gedeeltes van die vrugblare met die res van die vrugbeginselanlage opwaarts gegroei het, het tussenskotte ontstaan wat die vrugbeginsel in aparte hokke verdeel.

Op hierdie stadium is die sentrale as van die jong vrugbeginsel min of meer keëlvormig (Fig. 2, D, a). Die wande van die vrugbeginsel is naastenby parallel met die as en gevolglik is die jong vrughokke in 'n radiale lengte-deursnee deur die blomknop skuins vertikaal afgeplat (Fig. 2, D, vh).

Deur 'n groeiverskynsel waarvan al by die bespreking van die ontwikkeling van die meeldraadkrans melding gemaak is, neem die hele blomknop nou vinnig in deursnee toe en word die perifere gedeeltes van die blom bodem opgestoot. Gevolglik neem die deursnee van die vrugbeginsel ook aansienlik toe en die buitewande van die vrughokke wat eers min of meer parallel was met die keëlvormige as (Fig. 2, D) neem nou 'n feitlik horisontale posisie in (Fig. 2, E en F). Die vrugbeginsel waarvan die grootste gedeelte bostandig was, word onderstandig. Die weefsel wat in die breë basis van die as geïnkorporeer was, word na die bodem en later na die wande van die vrughokke verskuif.

Terwyl die genoemde asweefsel verplaas word, ontstaan in die oppervlakkige gedeeltes daarvan 'n *plasenta*. Die jongste plasenta weefsel wat as sulks beskou kon word, was vir die grootste gedeelte al bodemstandig maar 'n stuk daarvan was nog op die basale gedeelte van die as geleë (Fig. 2, D, p). Die eerste differensiasie van saadknoppe is waargeneem op 'n plasenta wat in 'n bodemstandige posisie was maar waarvan die buitenste gedeelte al wandstandig was (Fig. 2, E, p). Die eerste saadknop word op die plasentagedeelte naaste aan die as aangelê en die ontwikkeling van verdere saadknoppe vind van hieraf sentrifugaal plaas. In die volwasse vrugbeginsel word die oudste saadknoppe dus onder in die vrughokke aangetref en die jongstes bo.

Op 'n betreklik laat stadium in die ontwikkeling van die vrug neem die boonste gedeeltes van die plasenta vinnig in dikte toe. As gevolg hiervan ontstaan holtes aan weerskante van elke tussenskot (Fig. 2, F).

In elk van hierdie holtes groei 'n enkele saadknop op 'n lang funikulus (Fig. 2, F, ss). (Die aanwesigheid van aparte hokke in die vrug word kortliks bespreek by die morfologie van die volwasse vrug.)

TAKSONOMIESE BESKRYWING.

SKIATOPHYTUM

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Meerjarige, mesofitiese kruidgewasse. *Wortel* dik, vlesig, min vertak. Twee tipes *stingels*: 1. Oorblywend, baie kort, steriel; 2. Eenjarig, sappig, liggend met lang litte. *Blare* sittend, afwisselend tot skynbaar teenoorstandig, plat, slap, sonder steunblare. *Blomme* tweeslagtig, reëlmatig, enkelstandig, eindstandig. *Kelkblare* 5, vry, ongelyk, staan op kort asbeker. *Kroonblare* baie, vry, lynvormig, skerp. *Staminodia* baie, vry, draadvormig. *Nektaarkliere* in 'n aaneenlopende kring. *Meeldrade* baie, draadvormig. *Style* 4 tot 7, elsvormig. *Vrugbeginsel* onderstandig, 4- tot 7-hokkig; plasenta wandstandig. *Vrug* 'n omgekeerd keëlvormige doosvrug met 4 tot 7 vrughokke en kleppe; vrughokke diep en oop, kleppe sonder kiele of klepverke; vrug bars met kleppe oop as dit ryp is, bly oop. *Sade* niervormig, afgeplat, oppervlakte vratjiesagtig.

Monotipies.

- S. tripolium** (L.) L. Bolus in *S. Afr. Gdng. Country Life* 17: 435 (1927); L. Bolus, *Notes on Mes.* 1: 134 (1928); Von Poellnitz, *Repert. Nov. Spec.* 32: 67 (1933); Jacobsen, *Repert. Nov. Spec.* 106: 191 (1938); L. Bolus in *Adamson & Salter, Fl. Cape Peninsula* 375 (1950).

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Mesembryanthemum expansum non Linn. Thunberg, *Fl. Cap.* ed. 2: 417 (1823).

Afbeeldings: Plukenet, *Mantissa*, tab. 329 fig. 4 (1700); Dillenius, *Hort. Elth.*, tab. 179 fig. 220 (1732); Bradley, *Hist. Succ. Pl.*, tab. 47 (1739); Salm-Dyck, *Monogr. gen. Aloes et Mes.*, par. 64 (1836—49); Berger, *Mes. u. Port.* 43 (1908); L. Bolus, *Notes on Mes.* 1: 15 (1928); Schwantes, *Mitt. Inst. allg. Bot. Hamburg* 8: 162, 163 (1929); Schwantes, *Mitt. bot. Mus. Univ. Zürich* 193: 32, 33 (1951); Straka, *Nova Acta Leopold.*, fige. 7, 8, 16—19, 21, 69—74, 100 (1955).

Meerjarig, gekweekte eksemplare soms tweejarig. *Oorblywende stingel*, is bogronds 1·0—1·8 cm. lank, dra 'n roset van blare maar nooit blomme nie; in ouer plante word gedeeltes van die oorblywende stingel ook ondergronds aangetref waar dit verlengde litte besit en verkurkte oorblyfsels van rosetblare dra. *Eenjarige stingels* staan in oksels van rosetblare, is 10—100 cm. lank, ·7—·8 cm. dik en dra blare, blomme en sytakke. *Blare* omgekeerd lansetvormig tot lanset-spatelvormig, stomp tot taamlik skerp, aflopend tot 'n gegroefde, stingelomvattende, gevleuelde blaarsteel, gaafrandig tot effens gekartel; rosetblare 6—22 cm. lank, 1·5—3·4 cm. breed en ·3—·4 cm. dik; blare op eenjarige stingel 4—11 cm. lank, 1·0—2·5 cm. breed en ·2—·3 cm. dik. *Blom* 3—5 cm. in deursnee; steel 1·5—11 cm. lank. *Kelkblare*: Buitenste twee min of meer loofblaaragtig, driehoekig, 1·0—2·3 cm. lank; derde kelkblaar effens korter, min of meer driehoekig, met een vliesige rand wat deur die rand van die buitenste kelkblaar bedek word; die binneste twee ovaalvormig tot amper rond, met breë vliesige rande en 'n dorsale uitsteeksel, totale lengte 1·0—1·3 cm. *Kroonblare* wit, ·9—1·7 cm. lank en ·05—·1 cm. breed, ewelank of weinig langer as kelkblare. *Staminodia* wit, ·7—1·4 cm. lank en ·025—·05 cm. breed. *Meeldrade* ·6—·7 cm. lank. *Style* 4—7 meestal 5, ·6—·7 cm. lank. *Vrugbeginsel* skerp 5-hoekig, riwwe op hoeke met of sonder tandjies; bokant vlak keëlvormig, deursnee 1·0—1·9 cm. *Vrug* 5-hoekig, 1·6—2·4 cm. in deursnee; steel 3·0—16·0 cm. lank; kleppe ·5—·7 cm. lank en ·5—·6 cm. breed aan basis; vrughokke 1·1—1·4 cm. diep; tussenskotte staan keëlvormig oor die vlak uit waarin die kelkblare ingeplant is. *Saad* ·18—·22 cm. lank.

Bloeiperiode: Augustus—Desember.

PIKETBERG: Pickeniers Pass, 1910, *Pearson* 5209 (BOL); hills W. of Moutons Vlei, Piquetberg Range, 1934, *Pillans* 7737 (BOL).

PAARL: Simonsberg, 1953, *Göldner* STE 27597, 27598; La Motte, Franschhoek, Sept. 1954, *Leistner* STE 27607, 27612, 27613.

STELLENBOSCH: Near Millstream, Stellenbosch, 1924, *Duthie* 1571 (STE); Suikerbosrand, Vloottenberg, Nov. 1953, *Leistner* STE 27601—27604; Jonkershoek, Des. 1954, *Leistner* STE 27608—27611.

KAAP: Blinkwater Ravine, Table Mountain, 1939, *Salter* s.n. (BOL).

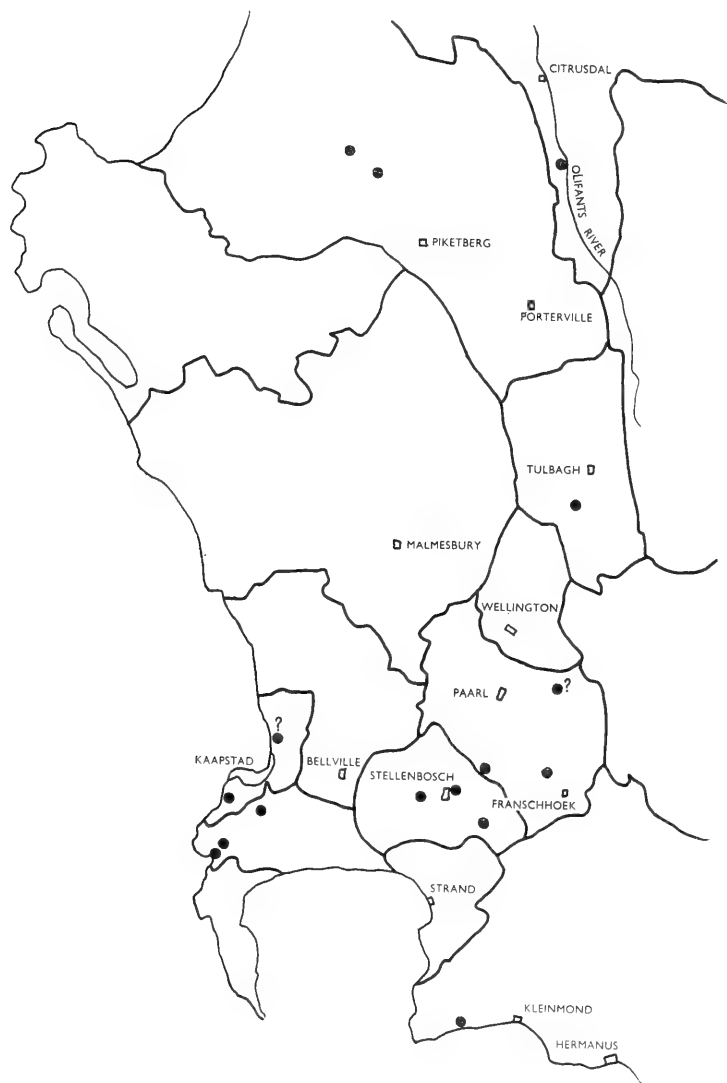
WYNBERG: Orange Kloof, Table Mountain, 1892, *H. Bolus* 7930 (BOL); behind Hout Bay Hotel, 1897, *Wolley Dod* 3509 (BOL); growing wild at Kirstenbosch, 1927, *Lavis* s.n. (BOL); Kirstenbosch, Nov. 1953 *Leistner* STE 27599, 27600.

CALEDON: Bettiesbaai, rivierbedding onderkant brug, Nov. 1953, *H. Meyer* STE 27605.

SINE LOCO: *Dillenius*, Herb. Sherard. 479 (OXF); *Drege* s.n. (K); *Leipoldt* s.n. (BOL); *Thunberg* s.n. (S).

VERSPREIDING EN EKOLOGIE.

(Sien kaart.)



Verspreiding van *S. tripolium*.

Die genus is endemies in die suidwestelike distrikte van die Kaap-provinsie. Vir spesifieke vindplekke word verwys na die lys van ondersoekte herbariumeksemplare in die voorafgaande paragraaf. Plekke waar *Skiatophytum* al gevind is maar waarvandaan geen herbariumeksemplare ondersoek is nie, is die volgende:

CLANWILLIAM: Oliphants River Valley nr. Warm Baths, *Stephens* 7176 (N. E. BROWN, 1928).

TULBAGH: Tulbagh Waterval (tuineksemplaar).

PAARL: „Prope Tois Kloof”—waarskynlik naby die huidige Du Toitskloof (THUNBERG, 1823).

KAAP: „Prope Rietvalley”—moontlik naby Milnerton (HARVEY & SONDER, 1894).

Plante wat in die natuur aangetref is, het almal onder feitlik dieselfde toestande gegroei wat kortliks as volg saamgevat kan word: (1) Reënval tussen 50 en 100 cm. per jaar, (2) aan die voet van berge of teen berghange, maar nooit hoër as 250 m. vanaf die voet van die berg nie, (3) langs of naby 'n stroom wat dwarsdeur die jaar water hou, (4) humusryk sandgrond, (5) skaduwee vir minstens 'n gedeelte van die dag. Hierdie waarnemings dui daarop dat die genus 'n beperkte toleransie besit.

Die verspreidingsgebied van die geslag stem ongeveer ooreen met die streek van die Boland wat 'n jaarlikse reënval van tussen 50 en 100 cm. het. Die toestande in hierdie streek voldoen egter nie deurgaans aan die habitatsvereistes van die genus nie. Dit toon dus binne sy areaal 'n diskontinue verspreiding. In die volgende distrikte wat almal binne die verspreidingsgebied van die genus lê, is dit nog nie versamel nie: Malmesbury, Wellington, Worcester, Bellville, Simonstad en Somerset Wes.

Hoe die diskontinue verspreiding van die genus ontstaan het, is nie met sekerheid te sê nie. 'n Moontlike verklaring is dat die watervoorrade in die suidwestelike streke van Kaapland in vroeër pluviale periodes groter was as wat dit vandag is. Onder sulke toestande kon die genus groot gedeeltes van die Boland, insluitende die vlaktes, bewoon. *Conicosia* N.E.Br. en *Carpanthea* N.E.Br., twee geslagte wat met *Skiatophytum* verwant is maar wat 'n groter toleransie toon, is vandag nog wyd versprei in die suidwestelike streke van Kaapland. Deur die toenemende ariditeit in hierdie gebied was *Skiatophytum* genoodsaak om na vogtiger staanplekke terug te trek waarin dit vandag uitsluitlik aangetref word.

VERWANTSAP.

SCHWANTES (1947) en STRAKA (1955) plaas *Skiatophytum* en die drie ander geslagte van die *Mesembryanthemeae* wat gekenmerk word deur vrugte met saadsakkies en bodem- of wandstandige plasentas, in die tribus *Apatesieae* Schwant.

Die belangrikste kenmerke van die vier geslagte in hierdie tribus is soos volg:

1. *Apatesia* N.E.Br.—Eenjarige kruidgewas; blare weinig sappig, afgeplat; *blomme* enkelstandig, geel; *vrugbeginsel* skottelvormig; *vrug* 'n higroskopiese doosvrug met (7)—9—(16) hokke; *kolumella* (asweefsel in volwasse vrug) goed ontwikkel.

2. *Conicosia* N.E.Br.—Meerjarig; oorblywende stingel bogronds uiters kort, dra 'n roset van sappige blare en lang, liggende eenjarige stingels; *blomme* enkelstandig, geel, uitsluitlik op eenjarige stingels; *vrugbeginsel* skottelvormig; *vrug* 'n nie-higroskopiese doosvrug met 10—20 hokke wat neiging tot splitsvrug toon; *kolumella* goed ontwikkel.

3. *Herrea* Schwant.—Stem in alle belangrike kenmerke met *Conicosia* ooreen maar *vrug* altyd 'n nie-higroskopiese splitsvrug; *kolumella* meestal goed ontwikkel.

4. *Skiatophytum* L.Bol.—Vegetatief soos *Conicosia* en *Herrea* maar blare plat; *blomme* enkelstandig, wit; *vrugbeginsel* omgekeerd keëlvormig; *vrug* 'n nie-higroskopiese doosvrug met (4)—5—(7) vrughokke, toon geen neiging tot splitsvrug nie; *kolumella* swak ontwikkel of afwesig.

SCHWANTES (1947) plaas *Skiatophytum*, *Conicosia* en *Herrea* in die subtribus *Conicosiinae* en *Apatesia* in 'n aparte subtribus *Apatesiinae* Schwant. STRAKA (1955) groepeer *Apatesia*, *Conicosia* en *Herrea* saam onder die *Apatesiinae* en skep 'n nuwe subtribus *Skiatophytinae* waaronder net *Skiatophytum* resorteer.

Van hierdie twee indelings word dié van STRAKA as 'n beter weer-gawe van die natuurlike verwantskapsverhoudings beskou.

Die plasing van *Skiatophytum* in 'n aparte subtribus word aanvaar omdat dié genus ten opsigte van die volgende kenmerke van die ander genera van die *Apatesiinae* verskil:

1. Aantal vrughokke; 2. vruganatomie (STRAKA, 1955); 3. vorm van vrugbeginsel; 4. kolumella; 5. blomkleur.

Die genus wat naaste aan die *Apatesiinae* staan, is *Carpanthea* N.E.Br. Die belangrikste kenmerke van hierdie geslag is die volgende: Eenjarige kruidgewasse wat op 'n vroeë stadium moeilik te onderskei is van jong eksemplare van *Skiatophytum*; *blomme* geel, toon groot ooreenkomste met dié van *Apatesia*; *vrugbeginsel* skottelvormig; *vrug* 'n higroskopiese doosvrug met 10—20 hokke en saadsakkieagtige strukture; *kolumella* goed ontwikkel.

SUMMARY.

1. *Skiatophytum* is a genus of the *Mesembryanthemaceae* (*Aizoaceae*). The variation in the genus is of such a nature that only one species can be recognized: *S. tripolium* (L.) L.Bol.

2. *S. tripolium* is a perennial mesophytic herb. Superficial roots can form suckers from adventitious buds. A rosette of leaves is borne on a short, perennial, sterile stem. Prostrate annual stems originate in the axils of the rosette leaves. The leaves on annual and perennial stems are arranged in a 2/5 spiral. Leaves on the annual stem are sometimes apparently opposite. The valves of the fruit are devoid of expanding keels and the fruit is non-hygroscopic.

3. The percentage germination of untreated seeds is very low. Seeds treated with a 50 per cent. KOH solution for 4—5 hours germinate within a few days. The entire embryo, not only the radicle, is enclosed in a thin layer of endosperm.

4. The sepals are arranged in a 2/5 spiral which is continuous with that of the leaves. The androecium is initiated in the five sectors of the growingpoint that alternate with the sepals. Several whorls of staminal primordia are formed later. The inner whorls are differentiated into stamens, the outer into petals whilst the primordia between them develop into staminodes. The placenta is initiated in a more or less basal position.

5. A taxonomic description is given (including synonymy, localities and reference to illustrations).

6. *S. tripolium* is endemic in the Southwestern Cape Province. The tolerance of the species is very limited and its distribution is discontinuous.

7. The genus is classified under the tribe *Apatesieae* Schwant. and should be placed in the subtribe *Skiaophytinae* Straka.

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Plate I. *Aloe Descoingsii* Reynolds.

Plant 1/1, from the top of a limestone cliff near Anjamala Village,
46 km. NE of Tulear, Madagascar, cult. Johannesburg, fl. August 1957.

Height 13 cm.

Photo: By courtesy Dr. R. A. Dyer, Chief, Division of Botany, Pretoria.

A NEW ALOE FROM MADAGASCAR

By G. W. REYNOLDS.

(With Plate I.)

Aloe Descoingsii Reynolds. Species nova, affinis *A. jucundae* Reynolds, pedunculo graciliore, inflorescentia brevior, racemo capitato, floribus rubris brevioribus differt.

Planta parva, sobolifera, mox caespitosa.

Folia ca. 8—10, dense rosulata, ovato-attenuata, 30 mm. longa, 15 mm. lata, patentia vel recurvula; *supra* viridula, parce tuberculato-maculata; *subtus* convexa; marginibus dentibus cartilagineis albidis 1 mm. longis, 1—1.5 mm. distantibus armata.

Inflorescentia simplex, 12—15 cm. alta. *Racemus* capitatus, 12 mm. longus, 25 mm. diam., ca. 10-floribus.

Pedunculus gracilis, 1—1.5 mm. diam., *Bracteae* ovato-acutae, 2 mm. longae, 1 mm. latae. *Pedicelli* 5 mm. longi.

Perianthium coccineum, cylindricum, 7—8 mm. longum; *segmenta exteriora* per 2 mm. libera. *Antherae* non exsertae. *Stigma* demum non exserta. *Ovarium* 1.5 mm. longum, 1.5 diametro. (Plate I.)

MADAGASCAR. Tulear Province: top of limestone cliff near Anjamala Village, about 46 km. N-E of Tulear, 350 m. alt., ca. 44° E., 23° 11' S., cult. Tananarive, fl. 15 June 1957, Descoings 2440! holotype (TAN), isotype (PRE); cult. Johannesburg et Pretoria, fl. Aug. 1957, Descoings et Reynolds 8304, (PRE).

Our new species was discovered in 1956 by Mr. B. Descoings (Botanist at the Institut Recherche Scientifique de Madagascar, Tsimbazaza, Tananarive) about 1 km. beyond Anjamala Village, which village is about 45 km. north-east of Tulear on the south-eastern side of the Fiherenana River.

Mr. Descoings found large numbers of plants on the top of a limestone cliff in scanty soil facing south. This locality is c. 44° E., 23° 11' E., at c. 350 m. alt.

Plants collected by Mr. Descoings flowered in Tsimbazaza in April and June 1957, while some of those sent to me flowered in Johannesburg and Pretoria in August 1957, when the description was completed.

I am happy to name this charming little species after the discoverer, Mr. Descoings, who accompanied me throughout Madagascar investigating the Aloes in 1955, and to whom I am greatly indebted for much assistance in many directions.

A. Descouingsii is a most distinctive species with rosettes of leaves only 5—6 cm. across, a very slender simple inflorescence 12—15 cm. high, and red flowers only 8—10 mm. long in a capitate raceme.

In habit of growth rosettes and leaf characters, *A. Descouingsii* bears a very striking resemblance to *A. jucunda* Reynolds on Gaan Libah, western end of the Golis Range, between Hargeisa and Sheikh, in Somaliland Protectorate, but the latter has a thicker peduncle, a taller inflorescence 20—30 cm. high, and lax racemes of rose-pink cylindric flowers 24 mm. long. (Another closely allied new species with distichous leaves, and very small white flowers, collected by Mr. Descouings near Ambato-finandrahana, will be described when flowers are available.)

DESCRIPTION. *Plant* succulent, suckering freely and forming dense groups.

Stem none or very short.

Leaves about 8—10, densely rosulate, ovate-attenuate, up to 30 mm. long, 15 mm. broad at base, spreading to recurved; *upper surface* flat low down, canaliculate upwards, rough to the touch, dull green with numerous dull white tubercular excrescences throughout giving a white-spotted effect; *lower surface* rounded, similar to upper surface in colour and tubercular excrescences; *margins* somewhat involute, armed with firm white cartilaginous deltoid teeth that are 1 mm. long, 1—1.5 mm. apart low down, smaller upwards, obsolescent near apex.

Inflorescence simple, 12—15 cm. tall.

Peduncle 1.5 mm. thick near base, 1 mm. below the raceme, brown with a slight bloom, clothed with up to 10 sterile-bracts that are amplexicaul, narrowly deltoid, about 6 mm. long, 2 mm. broad at base.

Raceme capitate, about 10-flowered, the pedicellate portion 12 mm. long, 25 mm. diam., youngest buds obliquely spreading to horizontally disposed, open flowers nutant.

Bracts ovate-acute, 2 mm. long, 1 mm. broad, thin, scarious, white, 1-nerved.

Pedicels slender, 5 mm. long, 1 mm. thick.

Perianth scarlet, paler to slightly orange at mouth, cylindric, 7—8 mm. long, basally flat and shortly stipitate, 4 mm. diam. across the ovary, narrowing to 3 mm. at the mouth; *outer segments* free for 2 mm. 3-nerved, the apices subacute, slightly spreading; *inner segments* broader than the outer, with more obtuse more spreading apices.

Filaments filiform, the 3 inner narrower and lengthening before the 3 outer with their *anthers* not exerted.

Stigma not exerted.

Ovary green, 1.5 mm. long, 1 mm. diam.

ACKNOWLEDGMENTS

I am indebted to:

Mr. B. Descoings for sending several plants of this species to me and also of another new species which is awaiting description, and for much other assistance.

Dr. R. A. Dyer, Chief, Division of Botany, Pretoria, for the facilities of the National Herbarium, and for photographing my plants while I was away.

NOTES ON THE GENUS CRASSULA

By VERA HIGGINS

In 1929, in the *Transactions of the Royal Society of South Africa*, Vol. XVII, Dr. Schonland published an important paper entitled *Materials for a Critical Revision of Crassulaceae (The South African Species of the genus Crassula L. (emend. Schonl.))*. This is still the standard work on the genus and new species described since this date have been fitted into the classification proposed by Schonland but, as is only to be expected in so large a genus—223 species are recognised in this paper—there are some errors and discrepancies to which attention has been drawn from time to time.

The following notes are designed to help clarify the position in the light of present knowledge and to indicate where further field work would be useful. The early literature on the subject is more readily available in Europe and knowledge of the type of change induced in plants grown under the unnatural conditions of a greenhouse helps in the interpretation of the early illustrations made from plants cultivated in Europe, but in cases of doubtful identification the final verdict must rest on investigations of the plants in their natural habitats.

When succulent plants from South Africa were first received in Europe early in the 18th century, they were grown under conditions that were too hot and too moist so that they tended to lose their original characteristics; the requirements of succulent plants in cultivation are now better understood and it is possible to keep them reasonably true to type by proper observation of the time and duration of the resting period required. In this way the plants can be studied at all stages of their annual life cycle and variants of species received from South Africa, whose native habitat is known and recorded, can be grown together and their behaviour compared. I have been growing *Crassulas* in this way for over twenty-five years, both those imported direct and others which have been long in cultivation. I may add that, to prevent possible hybridization, the plants have always been propagated vegetatively, never from seed.

The value of herbarium material is not underestimated but, for species described in the early days, there is little remaining; for instance, there are only 12 sheets of the *Crassulas* collected by Thunberg. Moreover, the very considerable variation that occurs, in some species particularly, is not indicated by a single herbarium specimen which may not have been typical of the colony of plants from which it was collected. When

the first *Crassulas* were named, the fixity of species was still an accepted principle of botany.

Crassulas have no economic uses nor are they of general horticultural interest but they are being increasingly grown by people who specialise in succulent plants and it is desirable that the nomenclature should be checked as far as possible and the range of variation in polymorphic species recognised.

The genus *Crassula* was first set up in 1732 by Dillenius in *Hortus Elthamensis*, where he described and figured seven species, one of which later proved to be *Portulacaria afra*. These species were adopted by Linnaeus who added 24 new names, ten in the first edition of *Species Plantarum* (1753), three in *Plantae rariores africanæ* (1760), four in the second edition of *Species Plantarum* (1763) and seven in *Mantissa* (1767—71).

In 1778 Carl Peter Thunberg, who collected in South Africa, described 28 new species in a paper published in *Nova Acta Acad. Caes. Natur. Cur.* VI, (1778). This paper, which is not well known, is of interest because the species are classified, as follows:

FOLIIS PETIOLATIS

1. cordata, 2. spatulata.

FOLIIS SESSILIBUS CONNATIS

- a. *Scapo subnudo*: 3. tecta, 4. hemisphaerica, 5. montana, 6. barbata, 7. cotyledonis, 8. tomentosa, 9. cephalophora, 10. spicata.
- β. *Caule foliis imbricatis tecto*: 11. deltoidea, 12. corallina, 13. vestita, 14. columnaris, 15. pyramidalis, 16. alpestris, 17. turrita, 18. rupestris, 19. argentea.
- γ. *Caule foliis sparsis remotioribus*
 - a. *Foliis planis*: 20. retroflexa, 21. perforata, 22. thyrsiflora, 23. capitella, 24. crenulata.
 - β. *Foliis teretibus vel triquetris*: 25. pubescens, 26. mollis, 27. ramosa, 28. adscendens.

A description of each species is given and two of them, *Cr. pyramidalis* and *Cr. alpestris*, are illustrated; *Cr. adscendens* was, apparently, never referred to again by Thunberg.

In 1794, in *Prodrromus Plantarum Capensis*, Thunberg described 11 more new species that he had collected during his sojourn at the Cape from 1772—1775 and in his *Flora Capensis* (1825), edited by Schultes, another two species were described so that, in all, Thunberg added 40 species to the genus *Crassula*. Of these, at least 27 still bear the name he gave them and are species known and recognised to-day.

Early in the 19th century, A. H. Haworth in England, Ecklon and

Zeyher and others in South Africa added to the number of species described so that when Harvey published his account of the genus in *Flora Capensis* II (1862), he was able to include 99 species to which he added 10 names of "Species of Section *Globulea* unknown to us" and 35 names of "Doubtful Species of Section *Eu-Crassula* and species unknown to us."

Since Harvey's time the number of *Crassula* species known has increased considerably and there are probably still a number which have not yet been determined; the fact that many of them show a considerable range of variation in nature makes it important that more field work should be carried out in connection with this genus. It is unfortunate that a number of the species have been described from cultivated plants, without knowledge of or comparison with material from their native habitats. The object of these notes is to scrutinise some of the names which appear to be doubtful and to put in a plea for further examination in the field. The classification given by Schonland will be used as the basis of discussion.

SECTION III. STELLATAE

ARBORESCENS GROUP

In this Group Schonland recognised two species: *Crassula arborescens* and *Cr. argentea*.

Crassula arborescens (Mill.) Willd.

As synonym *Cr. cotyledon* Jacq. is cited and the suggestion made that perhaps Jacquin's name should have priority, but this is not so. The plant was first described by Phillip Miller in 1768 as *Cotyledon arborescens* but had not at that time flowered in England though it had been in cultivation for 30 years. Jacquin, in 1781, described and illustrated the same plant under the name *Crassula cotyledon* since, after he had had it in cultivation for 25 years, it produced flowers in 1778 and these showed that it belonged to the genus *Crassula*. The specific name given by Miller has priority over that given by Jacquin 13 years later.

In the British Museum is a type specimen labelled "*Crassula*, nova species exist. in Miscell. *Crassula Cotyledon* Jacq. Miscell. ii. 295. t. 19! (1781)", and on the back "Hort. Vindob. Jacquin". There is also another specimen, consisting of two bits of inflorescence and three leaves, labelled "*Crassula arborescens* (Cotyledon)"; below in pencil is written "*Crassula* . . . an *argentea* Linn. Suppl." and on the back "Hort. Florent. 1780".

The illustration in the Botanical Magazine t. 384 is taken from a plant which flowered at Chelsea Garden in 1797, probably for the first time in England since neither Miller nor Aiton saw this species in flower.

In *The Flora of South Africa* Marloth gives a good habitat photograph of the plant growing in the Karroo near Laingsburg.

In cultivation in England *Cr. arborescens* flowers very rarely; the plant grows well but is less compact than in nature and the leaves tend to be larger but keep their silvery colour and purple edge. It has a curious habit of dropping short branches which take root if they fall on a suitable medium.

***Crassula argentea* Thunb.**

Under this name Schonland has placed *Cr. portulacea* Lam. and *Cr. obliqua* Ait. after having examined the type specimen of *Cr. argentea* Thunb. at Uppsala; I have only seen a photograph of this but I am inclined to doubt Schonland's identification, especially as he himself has said (l.c. p. 201) that the two species (*Cr. arborescens* (Mill.) Willd. and *Cr. portulacea* Lam.) "are easily distinguished when alive, though with dried specimens it is sometimes difficult". Thunberg's specimen of *Cr. argentea* consists of a stout stem, topped by a corymbose inflorescence and bearing only one pair of leaves; one leaf appears to be twisted, and the other is about as broad as long. I have dried leaves of *Cr. arborescens* and *Cr. portulacea* under similar conditions and find that, whilst *Cr. arborescens* more or less retains the broad, ovate shape, in *Cr. portulacea* the leaves become markedly narrower in proportion to their length. In fact, Thunberg's specimen more nearly resembles *Cr. arborescens* than *Cr. portulacea*. The note pencilled on a herbarium sheet at the British Museum, referred to above, "an *argentea* Linn. Suppl." suggests that some earlier worker regarded *Cr. arborescens* as synonymous with *Cr. argentea* Thunb., not with *Cr. portulacea* Lam.

The name *Cr. argentea* was first published by Thunberg in 1778 (*Nova Acta Acad. Caes. Natur. Cur.* VI) and placed by him in his classification under the heading β *Caule foliis imbricatis tecto*, next to *Cr. rupestris*; the brief descriptions of the two plants differ only in the word "glabris" used to describe the leaves of *Cr. rupestris* and "argenteis" those of *Cr. argentea*, so that clearly Thunberg was describing a plant with silvery leaves. Thunberg's specimen of *Cr. argentea* was taken from a plant growing in the Dutch East India Society's Garden in Cape Town and Rondebosch; he does not appear to have found it in the wild; this would not be unlikely if his plant is the same as *Cr. arborescens* which has a very localised distribution. In fact, Schonland in 1902, when describing *Cr. nitida* says that "*Cr. arborescens* is not known in the wild though common in cultivation". It was found again by Mr. Pillans and its distribution is now known.

The name *Cr. argentea* was adopted by Linnaeus and repeated in

later botanical works but the identification of the plant intended is uncertain. Harvey lists it amongst his "Species unknown to us" and suggests that it may be *Cr. lactea* which is unlikely since Thunberg was also responsible for the description of *Cr. lactea* at a later date. J. G. Baker (*Journ. Bot.* 1897, p. 484) regarded it as *Cr. falcata*. In commenting on Schonland's paper, Eric Walther in *The Cactus and Succulent Journal of America* II, Pt. I, 1930, referring to *Cr. argentea* Thunb. as a synonym of the familiar *Cr. portulacea* Lam. says: "Schonland states that Thunberg's material is unmistakably this species but fails to account for Baker's considering this synonymous with *Cr. falcata*; and in fact a better example of a misapplied name it would be hard to find."

Since the name *Cr. argentea* Thunb. had fallen into disuse and is now uncertain in its application, it would be desirable to disregard it and revert to Lamarck's *Cr. portulacea*, with which is associated Aiton's *Cr. obliqua*.

***Crassula portulacea* Lam. and *Cr. obliqua* Ait.**

Crassula portulacea was described by Lamarck (*Encyclopédie* II, 172) in 1786 from plants which had been growing for some years in the Jardin du Roi at Paris; he said that it was believed to come from Africa. *Crassula obliqua* was described three years later in Aiton's *Hortus Kewensis*, Ed. 1, by Solander, the plant having been brought from the Cape of Good Hope by Masson who found it in the gardens at Rondebosch; it was considered as synonymous with *Cotyledon ovata* Mill., first described (without flowers) in Miller's *Gardeners' Dictionary*; the plant had been sent to him by Dr. Adrian van Royen of Leyden who had received it from the Cape of Good Hope. In the 2nd edition of *Hortus Kewensis* *Cr. portulacea* Lam is also given as a synonym of *Cr. obliqua* Ait. and in Desfontaine's *Tableau de l'Ecole de Botanique du Museum d'Histoire Naturelle*, 1804, *Cr. portulacea* and *Cr. obliqua* are regarded as synonymous.

Although Lamarck's description of *Cr. portulacea* (1786) antedates Solander's description of *Cr. obliqua* (1789) by three years, Haworth uses the latter name, regarding the former as the synonym. It is interesting that in his *Rev. Pl. Succ.* (1821) Haworth gives a variety *Cr. obliqua* β *rufo-cincta* which differs chiefly in having red edges to the leaves. Since *Cr. portulacea* was not described until it had been in cultivation for some years and, in those days, most succulent plants were grown under conditions that were too hot, too moist and often too shady, it is quite probable that the red edge to the leaf, characteristic of the plant in nature, may have been lost. Haworth, on the other hand, grew succulent plants under much better conditions which may account for his red-edged variety;

he does not say where it came from, but as he says it is "subtropicalis", that is, less than four inches, it may have been a seedling and, as he suggests, a distinct species. This is the first mention of the red edge so characteristic of *Cr. portulacea* in the wild and, usually, in cultivation now.

Harvey in *Flora Capensis* regards *Cr. portulacea* Lam. as the type and gives *Cr. obliqua* Ait. as a synonym.

The earliest illustration is in De Candolle's *Plantes Grasses*, t. 79 (1801); this was called *Cr. portulacea* and was drawn from plants in the Jardin du Roi, possibly the same stock from which Lamarck drew up his description; it shows a plant with pale leaves, slightly pointed and is not typical of the plant known to-day in the wild which normally has blunter apices to the leaves.

In *Das Kapland* (1908) Marloth gives two photographs (Plates 14 and 16) which show the plant in its habitat but since he states that the plants "with their thick stems and large, white-farinose, fleshy leaves make whole cliffs look whitish from a distance" it is obvious that he is referring, not to *Cr. portulacea* but to *Cr. arborescens* and, indeed, a similar habitat photograph is given in his *Flora of South Africa* (1924), under the name *Cr. arborescens*.

In 1918 G. V. Nash published a description of *Cr. portulacea* in *Addisionia* III, accompanied by a colour plate, t. 109, which was taken from a plant growing in the New York Botanic Gardens; it shows the characteristic shining green leaves with red edges. The same plant is illustrated in *Flowering Plants of South Africa* 7.156 (1924) and in each case *Cr. obliqua* Ait. is given as a synonym. As far as I can discover Schonland in 1929 was the first person to suggest that *Cr. portulacea* Lam. was synonymous with *Cr. argentea* Thunb.

At the present time there are a number of varieties in cultivation, most of which appear to be of recent and unknown origin. As far as I can learn this species does not vary greatly in the wild but for many years there have been two distinct plants grown in Europe; one, with shining green leaves that have red edges, is called *Cr. portulacea* and a paler variety whose leaves, even in full sun, rarely show any reddening, is generally called *Cr. obliqua*. There is a horticultural distinction between these plants in that *Cr. portulacea* flowers well in England when large enough but *Cr. obliqua* has not been known to flower here; the latter has the curious habit of dropping short branches in the same way as does *Cr. arborescens*; when kept dry or starved the oblique position of the leaves becomes more obvious.

Through the kindness of M. Vatrican, Director of the Jardin Exotique at Monaco, I have had the opportunity of seeing all three plants in flower, for in southern Europe there is not the same difficulty in flowering them

as in our more northern climate. The flowers are very similar but there are distinctions between them, as shown in the accompanying illustration (Fig. 1.). The chief differences are in the length of the calyx lobes and in the shape of the carpels; in both the styles are long and slender but the ovaries in *Cr. portulacea* are slender and slightly curved so that they stand close together whilst in *Cr. obliqua* the ovaries are gibbous below the styles which prevents the styles from touching. Also in *Cr. portulacea* the petals are wide-spread, at least to the horizontal position, whilst in *Cr. obliqua* they do not spread so widely. Comparison with the flower of *Cr. arborescens* shows that, in the length of the calyx lobes, position of the petals and shape of the ovary, the flower of *Cr. obliqua* agrees more closely than does that of *Cr. portulacea*.

The type specimen of *Crassula obliqua* Soland. in Aiton's *Hortus Kewensis*, which is in the British Museum, has rounded leaves like those of *Cr. portulacea* though occasionally slightly pointed tips occur. Since authorities who handled the plants alive—Lamarck, Solander and other contemporary botanists—regarded these two names as synonymous, I think this can be accepted as a fact. The illustration in *Plantes Grasses* t.79 was not published until 17 years after Lamarck's description; one cannot assume that it was from the same stock or, even if it was, that it had been vegetatively propagated; it might have been raised from seed which makes the chance of hybridisation a possibility.

The plant now known in cultivation as *Cr. obliqua* is not known to have been collected in the wild nor has it been found in South Africa, but descendants of plants grown 100—150 years ago, vegetatively reproduced, can still be found in European collections to-day. Possibly *Cr. 'obliqua'* of gardens is a descendant of the stock from which De Candolle's illustration was made.

One other name needs consideration, *Crassula nitida* Schonl., described in *Records of the Albany Museum* I.54 (1903); at the time Schonland regarded this plant as a new species and gave a comparison with *Cr. Cotyledon* L. and *Cr. portulacea* Lam. Later, however, he decided that it was not sufficiently distinct and regarded it as a synonym of *Cr. portulacea* Lam.; from the description it certainly sounds like the common form of *Cr. portulacea* as known in cultivation in Europe. The amount of variation in this species is not known but a number of new variants are beginning to appear; their origin is uncertain but some have certainly originated in gardens both in Europe and in South Africa. Such plants, if distinct enough to merit a new name, should be given a cultivar name.

Conclusion: The identity of *Cr. argentea* Thunb. is uncertain and this name should, therefore, be dropped. Contemporary authorities who knew

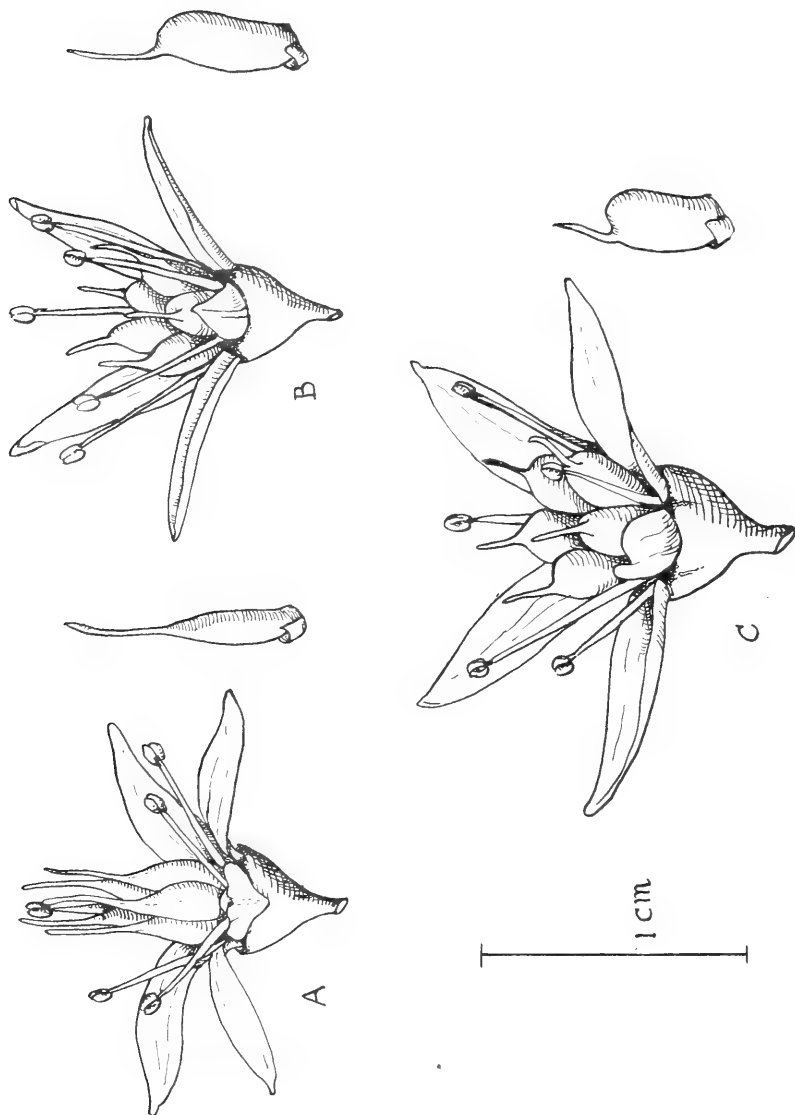


FIG. 1. A. *Crassula portulacea* Lam.; B. *Cr. portulacea* Lam. var. *obliqua* Ait.;
Cr. arborescens (Mill.) Willd.

the plant in cultivation in Europe considered *Cr. portulacea* Lam. (1786) and *Cr. obliqua* Ait (1789) to be synonymous; the older name therefore has priority. The form in cultivation usually known as *Cr. obliqua* may or may not be the *Cr. obliqua* of Aiton, described by Solander; since this form is not apparently known wild in South Africa it is best regarded as a variety, *Cr. portulacea* Lam. var. *obliqua* Ait. The newer variants of garden origin in Europe and South Africa which have come into cultivation in recent years should, if sufficiently distinct, be given cultivar names.

SECTION I. TILLAEIOIDAEAE

CORALLINA GROUP

As synonyms of *Crassula corallina* Thunb. Schonland gives *Cr. dasyphylla* Harv. and *Cr. simiana* Schonl. That this view is not fully accepted is indicated by the fact that two plants in cultivation to-day are known as *Cr. corallina* and *Cr. simiana*, their habit and mode of growth alone making it obvious that the plants are not identical. *Cr. "corallina"* has been in cultivation for some considerable time but *Cr. "simiana"*, a much more compact plant with short, erect stems, is of more recent introduction. The distribution of these two plants in the wild is different and investigation of the early descriptions and of herbarium specimens confirm that there are two distinct plants from distinct areas but the correct names are *Cr. corallina* Thunb. for the plant from the western districts (in cultivation now called *Cr. simiana*) and *Cr. dasyphylla* Harv. for the one from the east (in cultivation called *Cr. corallina*).

Cr. corallina was described by Thunberg who found it in dry fields at Hantam between Daunis and Roggeveldsberg; the plant has a fusiform root from which arise a number of erect stems about an inch high, the very fleshy, close-packed leaves covered in the upper half with white wax. *Crassula dasyphylla* was described by Harvey from two collectings, one made by Drège at Winterveld (between Victoria West and Richmond), the other by Zeyher at Cradock. No mention is made of the roots but the stems are prostrate, about 3—4 inches long, with fleshy leaves at short intervals. Harvey adds, however, that fragments "of a nearly similar but stronger plant was gathered by Zeyher at Bitterfontein; they differ from Zeyher's plant above quoted in having a large woody root and somewhat larger leaves, but are too imperfect for description;" but he did not identify this "stronger plant" with *Cr. corallina* Thunb. which he placed in his list of "Species unknown to us". This observation of Harvey's is the clue to the confusion; the "stronger plant" has been re-discovered and is in cultivation to-day, but under the name *Cr. simiana*, Schonl.; the name *Cr. corallina* has long been in use for the prostrate plant.

Crassula simiana was described by Schonland in 1897 from a plant received from "Stormberg" but later he writes (*Ann. Bolus Herb.* (1918) II. 75): "I am quite satisfied that my *Cr. simiana* cannot be specifically separated from *Cr. corallina*". Later again, in Report 12 of the Percy Sladen Memorial Expeditions (*Ann. Bolus Herb.* IX) he says of a plant from Richtersveldt "that there can hardly be any doubt that this is Thunberg's plant which was meant by Harvey as his *Cr. dasyphylla*. It seems however that the latter also included a species from the eastern parts of Cape Colony which is perhaps distinct, though closely allied, and which I have described as *Cr. simiana*." But Harvey was describing a plant from Winterveld and definitely rules out Zeyher's "stronger plant" from Bitterfontein, so that *Cr. simiana* Schon. is a synonym of *Cr. dasyphylla* Harv.

Herbarium material of so small and fragile a plant is not easy to determine; many of the specimens are broken, rather scrappy and without roots or flowers. In the British Museum is a specimen labelled: "*Cr. corallina* (Nov. Act. N.C. 6. p.334)" and on the back: "Prom. b. spei. Fr. Masson (Solander)" which was probably of the same collecting as the plant described by Thunberg since he and Masson collected together in South Africa. This specimen has several short stems arranged fan-wise from a common base and, though no root is present, it strongly suggests the thong-rooted plant, not Harvey's species with weak, prostrate stems. A note on this sheet alters the name to *Cr. dasyphylla* Harv. "see Journ. Bot. 1897. p.480.", so that this was the specimen which James Britten and E. G. Baker examined and considered identical with *Cr. dasyphylla* Harv.

Dinter, in 1914, gave an excellent illustration (*Neue und wenig bekannte Pflanzen Deutsch-Südwest-Afrikas*, Fig. 51) of a *Crassula* "Dtr. 3243" found at Klein-Karas which Schonland considered to be *Cr. corallina* Thunb. but later in 1928 (*Sukkulantenforschung in Südwestafrika* II, p. 94) Dinter himself considered it to be a distinct species, perhaps the one that Schonland had named *Cr. simiana*; he was regarding *Cr. corallina* Thunb. and *Cr. dasyphylla* Harv. as synonymous and thought that two species existed. In fact Dinter's plant was a re-discovery of *Cr. corallina* Thunb.

If the herbarium specimens at Kew and the British Museum are sorted according to the habit of the plants it will be found that those which represent *Cr. corallina* Thunb. come from such places as Hantam, Bitterfontein, Aus and Warmbad, that is the dry desert areas of the south west and Namaqualand, whilst those with the prostrate stems rooting at the nodes come from Winterveld, Cradock and Gamka River, Stormburg and Prieska, that is further east in a less arid climate. Emphasis

has been laid on the habit of the plants since this is more readily observed, especially in dried specimens, but there are also considerable differences in the flowers, as shown in Fig. 2 and in the table below; the details are

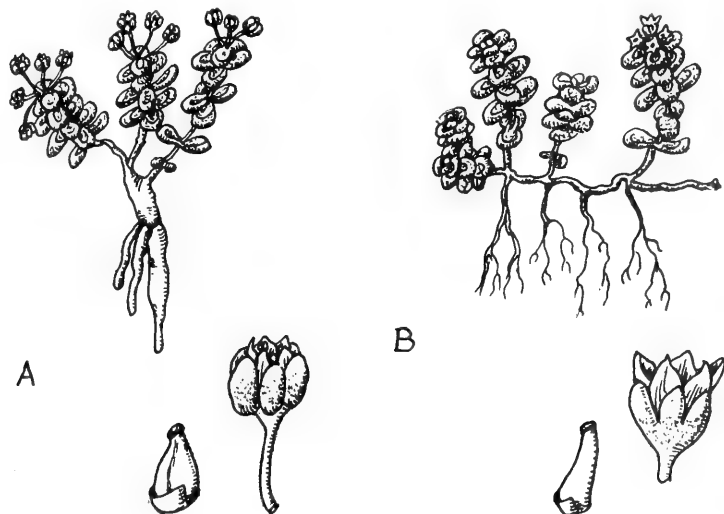


FIG. 2. A. *Crassula corallina* Thunb. (syn. *Cr. "simiana"* hort.); B. *Cr. dasyphylla* Harv. (syn. *Cr. simiana* Schönl.; *Cr. "corallina"* hort.). Plants nat. size.

taken from specimens received from Steinkopf and Springbok as *Cr. simiana*, and from the Steytlerville district as *Cr. corallina*. The plants were grown here for several years and changed very little from the condition in which they arrived except that, during one sunless autumn, when *Cr. corallina* Thunb. (*Cr. "simiana"*) became greener but remained compact whilst both the stems and leaves of *Cr. dasyphylla* Harv. (*Cr. "corallina"*) elongated considerably.

Cr. corallina Thunb.

Root: fusiform
Stems: erect, about 2·5 cm
Pedicels: 2—3 times longer than sepals
Sepals: very thick, obtuse, upper half with white wax
Petals: ivory white, firm, incurved or erect
Carpels: short, broad, style very short
Squamulae: large, greenish white

Cr. dasyphylla Harv.

fibrous, also from the nodes
prostrate, 7·5—10 cm
equal to sepals
thinner, more pointed, tips white
greenish white, thin, recurved
short, more slender, style longer
smaller, bright yellow

It would appear, therefore, that the species occurring in S.W. Africa is *Cr. corallina* Thunb. and the species common in East Cape Province is *Cr. dasyphylla* Harv. It is noteworthy that Thunberg emphasised the white wax on the leaves of his plant, which he likened to a marine coral. Harvey, on the other hand, named his plant for its likeness to *Sedum dasyphyllum*. In his description he does not mention the white wax on the tips of the leaves which is apt to disappear, both in nature and in cultivation, if the plant is growing under moist conditions. Schonland likened his *Cr. simiana* to *Sedum geminum* and does not mention white tips in the Latin description but says: "the upper part of the younger leaves is covered with granular wax arranged in a reticulate manner".

Conclusion: *Crassula corallina* Thunb. (syn. *Cr. "simiana"* hort.) and *Crassula dasyphylla* Harv. (syn. *Cr. simiana* Schonl.; *Cr. "corallina"* hort.) are two distinct species.

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DASYCLADUS RAMOSUS—A NEW SPECIES OF
DASYCLADUS FROM INHACA ISLAND AND
PENINSULA, PORTUGUESE EAST AFRICA.

by
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Department of Botany, British Museum (Natural History)

(With Plate II)

Dasycladus ramosus sp. nova (*Fig. 1*).

Type specimen: Collected June 25th 1957, Chamberlain No. 1, British Museum Spirit Collection (Algae) No. 479.

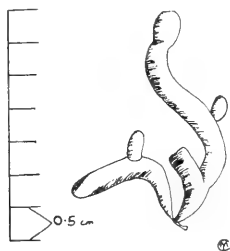


Fig. 1—*Dasycladus ramosus* sp. nova.
Drawing of the type specimen.

Alga parva atriviridis frondibus parce ramosis vermiformibus, 2—4 cm. longis, 4—8 mm. latis, ramo omni verticillis conferte superpositis induto; verticilla ramulis lateralibus numerosis plerumque 13—18 segmentatis composita et axem centralem seu siphonem undique obtegentia; ramulorum segmenta in seriebus tribus disposita; segmentum basale (seu primarium) oblongum medio plerumque leviter contractum $350\text{--}600\mu$ longum, $180\text{--}300\mu$ diametro, apice ferens segmenta mediana (seu secundaria) 4 anguste oblonga $300\text{--}480\mu$ longa, $120\text{--}260\mu$ diametro;

segmenta terminalia (seu tertiaria) 2—3 ex apice segmenti mediani exorta 140—360 μ longa, 90—160 μ diametro, apice rotundata.

Alga small with dark green sparingly branched worm-like fronds 2—4 cm. long, 4—8 mm. wide, each branch consisting of a central axis clothed with whorls of 13—18 segmented ramuli closely on top of one another; the ramuli with segments in three series; basal or primary segment oblong, often slightly pressed in at the middle, 350—600 μ long, 180—300 μ in diameter, bearing at its apex four middle or secondary segments which are narrowly oblong, 300—480 μ long, 120—260 μ in diameter; terminal or

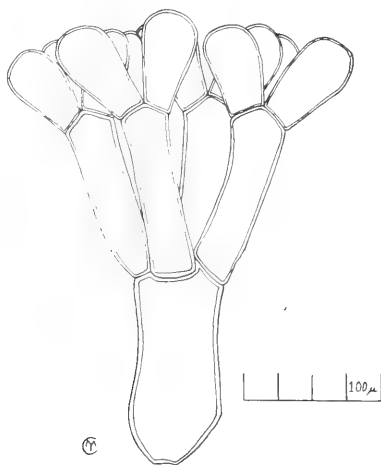


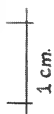
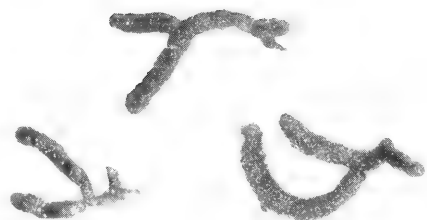
Fig. 2—*Dasycladus ramosus* sp. nova.
Single ramulus from the type specimen.

tertiary segments arising from the tip of each middle segment and 2—3 per segment, 140—360 μ long, 90—160 μ in diameter, with rounded apices (Fig. 2).

Type locality: Lighthouse rocks, Inhaca Island, Portuguese East Africa.

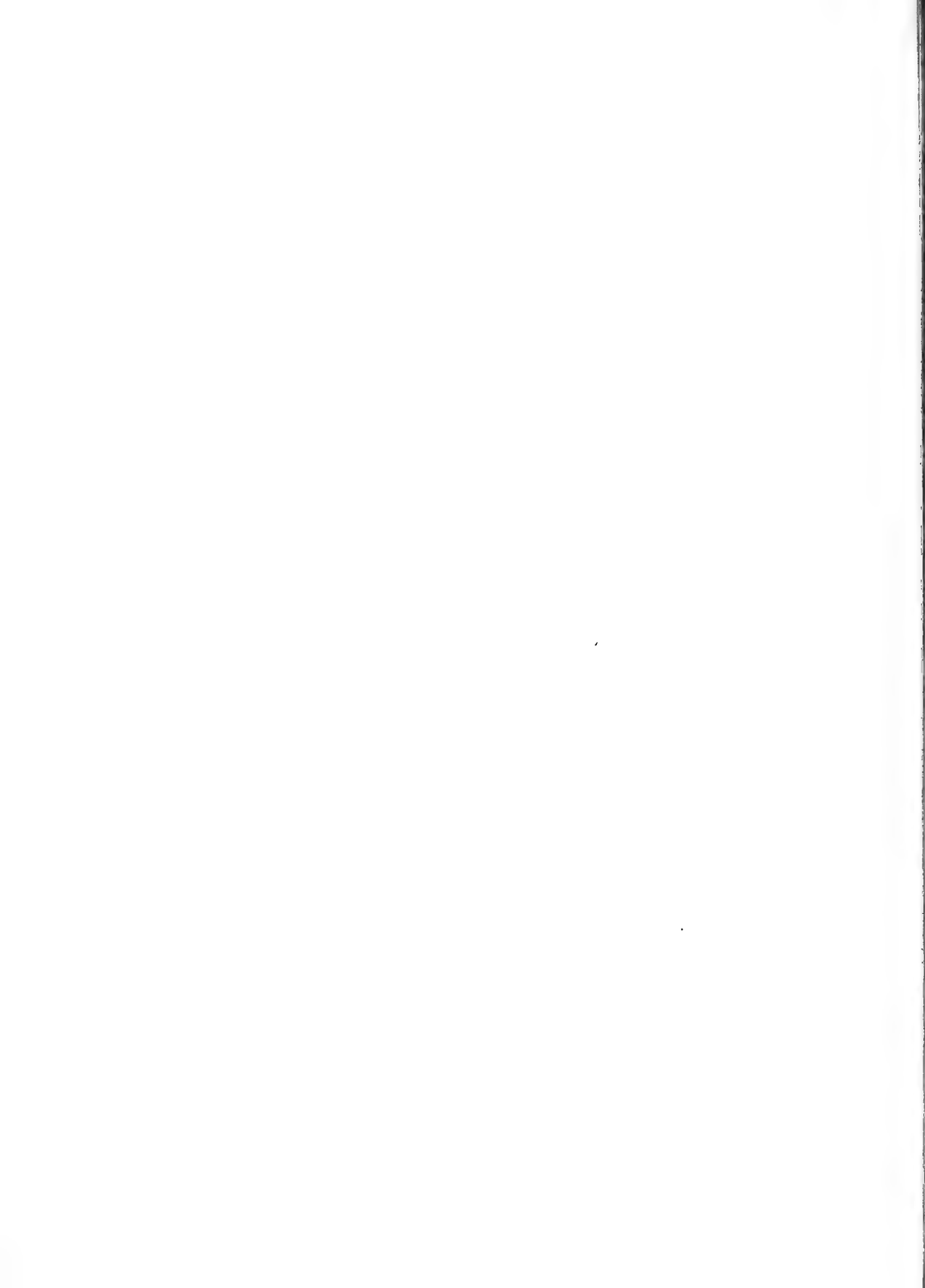
Distribution: Inhaca Island and Inhaca Peninsula, Portuguese East Africa.

This plant (Plate II) is found growing quite frequently in sand towards the bottom of intertidal rock pools at several localities on Inhaca Island and Peninsula. It grows in clumps and it is very noticeable that as soon as the clump is touched in the water, the water in the vicinity becomes bright green. No reference has been found to this happening



Dasycladus ramosus sp. nova. (B. 335.)

PLATE II.



with any other species of *Dasycladus*, but this may be because they have not been seen in the living state by the authors.

The plants collected in July 1956 are not reproducing, but there is no doubt from their general form and structure that they belong to the genus *Dasycladus*.

Only two other species of *Dasycladus* have so far been described of which by far the most common and widely distributed is the well known *Dasycladus vermicularis* (Scopoli) Krasser. *D. ramosus* differs from this species in being typically branched and because the terminal segments are widely rounded whereas they are always apiculate in *D. vermicularis*. The other species, *Dasycladus densus* Womersley was described from South Australia by Womersley in 1955.* *D. ramosus* differs from this species again in being branched and also in the shape of the basal segment. In *D. densus* this is markedly pear-shaped while in *D. ramosus* it is more or less rectangular or often with a slight depression in the middle. There was considerable variation in the size of the plant in those collected from the same locality but I have no doubt that all the *Dasycladus* material collected by me in the Inhaca area is of this species.

I gratefully acknowledge the help of Mr. W. T. Stearn of the British Museum who wrote the latin diagnosis.

*WOMERSLEY, H.B.S., "New Marine Chlorophyta from Southern Australia", *Pacific Sci.*, vol. 9, p. 387, 1955.

MARINE ALGAE OF INHACA ISLAND AND OF THE INHACA PENINSULA, II.

By

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and

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(With Plates III—VI)

INTRODUCTION

The first paper of this series (Isaac, 1956) included general comments on the marine vegetation and ecological conditions of Inhaca Island and the Inhaca Peninsula. An outline map of the region was also included. For convenience the localities which are referred to in this paper are listed below.

Inhaca Peninsula (East Coast): Santa Maria, Ponta Abril.

Inhaca Island:

West Coast—Estação Biologia Maritima, Ponta Rasa, Ponta Punduini at the extreme southern end.

South Coast—Saco (or Saco da Inhaca).

East Coast—Lighthouse rocks (used to include Cabo Inhaca).

The systems of classification used are the same as in the first paper on Inhaca seaweeds and as in "Some Marine Algae from Xai-Xai" (Isaac, 1957) which is referred to in the text of this paper as "Xai-Xai Algae".

References to literature are dealt with in the same way as in the first Inhaca and Xai-Xai papers. This includes the enclosing within brackets of a reference which has not been seen and indicating such with an asterisk in the list at the end of the paper.

CHLOROPHYCEAE

CLADOPHORALES

Chaetomorpha crassa (Ag.) Kütz.

See "Xai-Xai Algae", p. 78.

Santa Maria.

Cladophora prolifera (Roth) Kütz.

Sub-nom *Conferva prolifera*.

(Roth: *Cat. Bot.*, 1, p. 182.)

Sub-nom *Cladophora prolifera*.

Kützing: *Phycologia Germanica*, p. 207.

Hamel: *Rev. Algologique*, vol. 1, p. 172.

Santa Maria, Lighthouse rocks.

Material B.280 and B.349 agrees with Hamel's description of *Cladophora prolifera*.

The plants examined were up to about 5 cm. in height and occur as dense greenish brown tufts which become brownish in colour on drying. The filaments are tightly packed to form a compact sheaf. The lower cells and cells of the main axes have an increasing diameter from the base upwards being thus clavate in form but the distal cells are more or less cylindrical. (Fig. 1. A, B). The lower cells produce decurrent rhizoids which knit filaments together (Fig. 1, C). Hamel describes the rhizoids as being annular in their lower halves and much branched at their tips. The lower cells are annulated in a similar manner to the rhizoids. In the Inhaca plants the annulations of the rhizoids and lower cells extend almost the full length of the cells (Fig. 1, A, C).

Annular constrictions are not mentioned in Kützing's original description of the species. Börgesen refers to similar material found in the Canary Islands as *C. prolifera* (Börgesen, 1925, p. 61). The rhizoids of Canary Island plants are described by Börgesen as being annular throughout their length.

The Inhaca material described here as *C. prolifera* differs from the taxon recorded from the Union of South Africa as *C. rugulosa* Martens (once known as *C. prolifera*) especially in that decurrent rhizoids are absent in the latter.

Thanks are due to Mr. R. H. Simons for identifying the Inhaca material as *Cladophora prolifera* and for drawing Fig. 1.

SIPHONALES**Boodleopsis pusilla** (Collins) Taylor.

Sub-nom

Dichotomosiphon pusillus (Collins: *Tufts Coll.*

Stud., vol. 2, p. 431).

Sub-nom

Boodleopsis pusilla. Taylor, Joly and.

Bernatowicz: *Mich. Acad. Sci., Arts, Letters*, vol. 38, p. 97.

Saco (Mangrove Swamp).

The identification of specimen B.354 as *Dichotomosiphon pusillus* or a

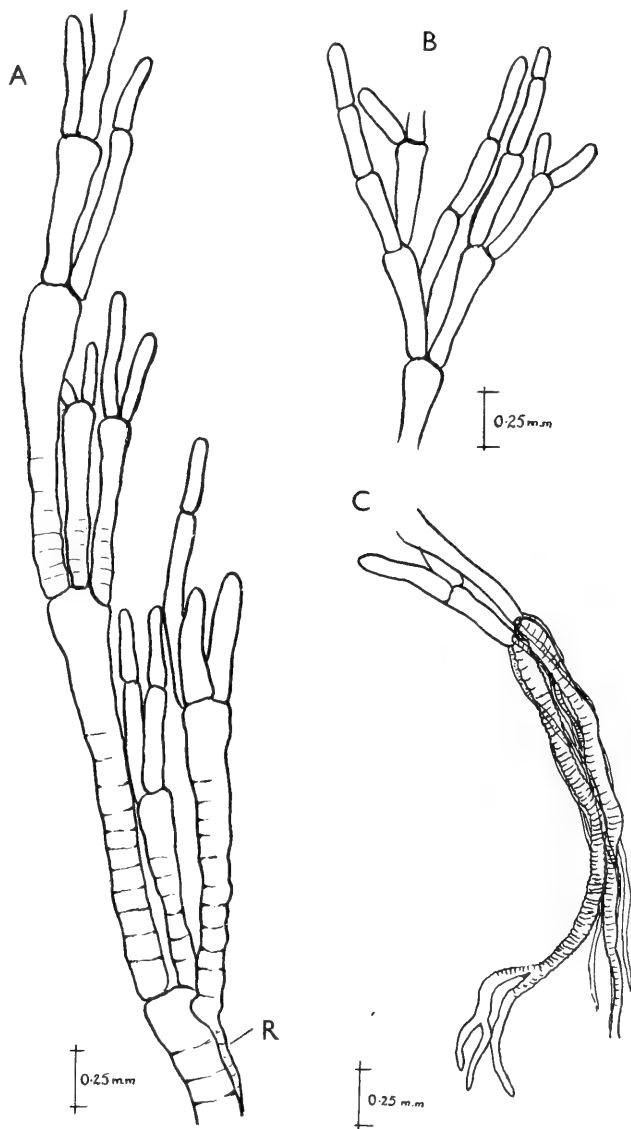


Fig. 1—*Cladophora prolifera* (Roth) Kütz.

- A. Cells of main axis. Lower cells showing annulations. R=Rhizoid.
- B. Cylindrical distal cells of branches.
- C. Rhizoids arising from lower cells. Note annulations on rhizoids.

closely related form was confirmed by Professor W. R. Taylor who transferred the genus *Dichotomosiphon* to *Boodleopsis* in 1953. Taylor sounds the cautionary warning that the material may be "protonemal stages of other, larger Codiaceae, and like moss protonemas may not be readily differentiated" (private communication). It is well to quote further from his letter: "As to the specimen, I see no reason to question that it is a *Dichotomosiphon* closely related to *pusillus*, if not identical. The diameter of the filaments seems a bit high: around $50\ \mu$ and the habit rather more compact, with more frequent akinetes than I have noted in natural-grown specimens in Bermuda. . . . Since you would not have the same species of Codiaceae at Inhaca Island as we would have at Bermuda, I have some hesitancy in swearing that the *Boodleopsis* specimens are identical. On the other hand, if they are not protonemas, I would have no hesitancy in calling yours, mine and Joly's Brazilian

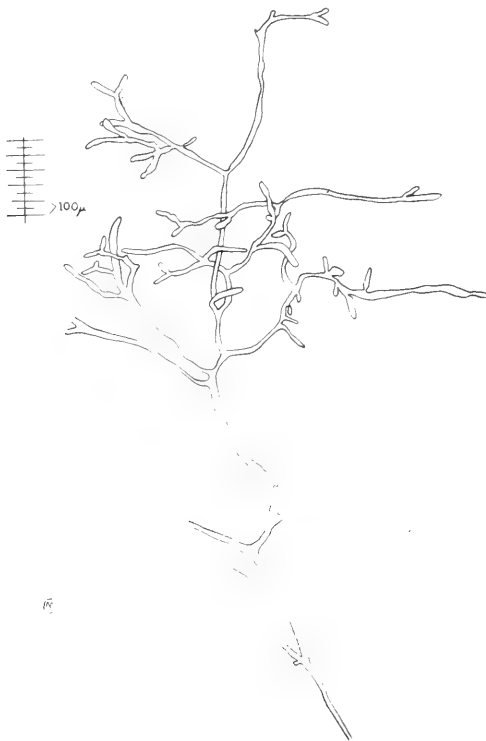
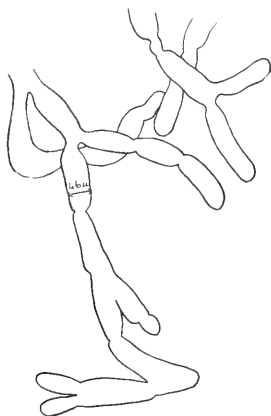


Fig. 2—*Boodleopsis pusilla* (Collins) Taylor. (B. 354.)

materials the same, simply slightly extending the range of the characters.” Details regarding identity, nomenclature and morphology of *Boodleopsis pusilla* are to be found in the paper by Taylor *et alia* (1953).

The morphology of the Inhaca material is illustrated in Figs. 2 and 3 which show the general dichotomous character of the branching, the coenocytic nature of the filaments and the presence of constrictions.



©

Fig. 3—Portion of *Boodleopsis pusilla* (Collins) Taylor (B. 354), showing branching and constrictions.

The specimens were collected in the Saco da Inhaca at the Southern end of the island where they grow on *Rhizophora* roots and on the fine black mud between mangrove trees. They are uncovered at low water and spread over the mud, in places forming a green network of moderate density.

In relation to the possibility of material B.354 being a protonemal stage of another larger member of the Codiaceae it may be remarked that such plants if they occur at all in the Saco must be rare or strictly seasonal. The only other siphonous Chlorophyceae at all common in this part of the island in July is *Acetabularia calyculus* (Isaac, 1956).

Caulerpa ambigua Okamura.

(Okamura, *Bot. Mag. Tokyo*, vol. 11, p. 4).

Okamura, *Icones of Japanese Algae*, vol. 3, p. 168, pl. 139.

Eubank, *Univ. Calif. Publ. Bot.*, vol. 18, No. 18, p. 410, Plate 22.

Sub-nom *Caulerpa vickersiae*.

(Börgeesen: *Bot. Tidsskr.*, vol. 31, p. 129, Fig. 2.)Börgeesen, *Mauritius Algae*, Additions (1949), p. 6.

Ponta Abril.

Fig. 4—*Caulerpa ambigua*. Okamura (B. 220A).

- A. General habit showing well developed prostrate system.
 B. Portion of B. 220A.
 C. Portion of B. 233A.

The Inhaca material of this species shows a well developed prostrate system (Fig. 4 A). The pinnae arise on the frond in a distichous manner although the arrangement is not quite regular (Fig. 4 B). On

some fronds a proportion of the pinnae show a limited apical bifurcation (Fig. 4, B and C), a feature seen in proximal rather than in distal pinnae. This species has been recorded from Mauritius under the name *Caulerpa vickersiae* Börg., by which name Börgesen maintains that the taxon should be known (Börgesen, 1949, P. 6; 1953, P. 6). The plants collected were small although falling within the size range for height given by Eubank (0.4—2 cms.).

This species was collected by Pocock and Papenfuss at Umhlali, about 30 miles north of Durban (Papenfuss, 1951).

***Caulerpa webbiana* Montagne.**

(Montagne: *Ann. Sci. Nat., Bot.*, vol. 9, p. 129).

Eubank, *Univ. Calif. Publ. Bot.*, vol. 18, p. 415, Fig. 1 and Plate 22.

Weber van Bosse: *Des Caulerpes*, p. 269, pl. 21, Figs. 1—4.

Ponta Abril, Lighthouse rocks.

The material examined (B.328) consists of small green spongy plants, resembling a very small *Codium* in general appearance. The fronds are up to 1.5 cms. high, mostly attaining a height of about 1 cm. The majority of fronds are erect, simple and densely covered with furcate, mucronate ramuli (Fig. 5). There are five or six ramuli per node. The prostrate rhizome, covered with sand particles, has numerous long branched rhizoids (Fig. 6) but is devoid of ramuli. The rhizome has a diameter of about 1 mm., the frond a diameter of 1—1.5 mm. while the ramuli are about 600 μ long.

Inhaca plants of *Caulerpa webbiana* differ from Eubank's description (1946, p. 415) in being somewhat smaller at their maximum size and in having 5 or 6 ramuli per node instead of 4 or 5. Weber van Bosse (1898) gives 3 to 6, generally 4, ramuli per node for f. *typica* with which forma the Inhaca plants best agree.

The possibility of this material being *Caulerpa pickeringii* Harvey and Bailey (\equiv *C. webbiana* var. *pickeringii* (Harvey and Bailey) Eubank) was considered since the two taxa are similar but on the basis of Eubank's delimitation of the taxa (Eubank, 1946) and the examination of the material available at the British Museum (Natural History) it was concluded that B.328 was not *Caulerpa pickeringii* Harvey and Bailey. The latter species is a more robust plant, the rhizomatous part is covered with ramuli, and there are six to twelve ramuli per node. That B.328 is a less robust and smaller plant than the described specimens of *C. pickeringii* may not be significant but on the basis of our present knowledge of these forms the presence of a decidedly smaller number of ramuli per node and especially the absence of ramuli on the rhizomatous region must be regarded as significant characteristics.

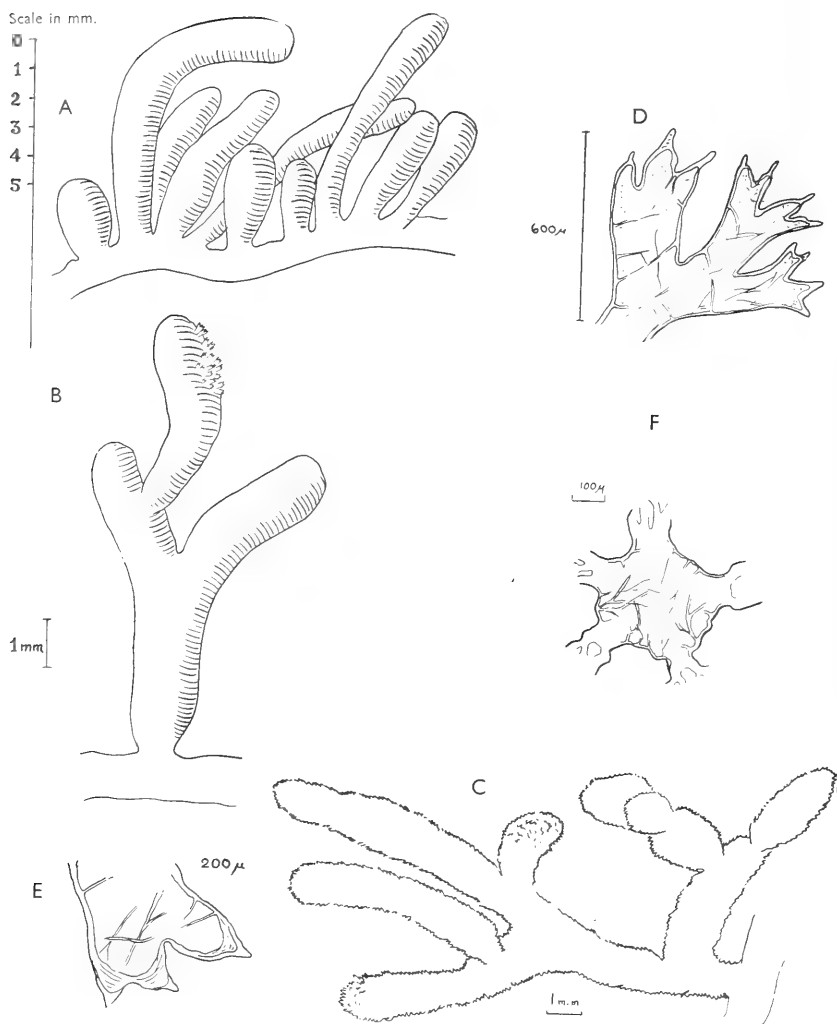


Fig. 5—*Caulerpa webbiana* Montagne. (B. 328.)

- A. Portion of Plant.
- B. Longest frond observed.
- C. Most branched frond observed.
- D. Distal portion of ramulus.
- E. Part of distal portion of ramulus.
- F. Transverse section of frond showing bases of ramuli.

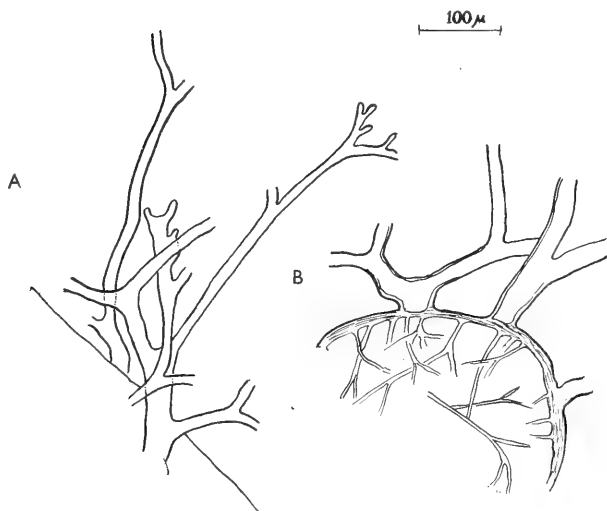


Fig. 6—*Caulerpa webbiana* Montagne (B. 328): rhizomatous prostrate part of plant.
A. Surface view showing long, branched rhizoids.
B. Transverse section with bases of rhizoids.
Note absence of ramuli.

On returning to the British Museum one of the authors of this paper, Miss Yvonne Chamberlain, made the following comment on B.328. "We have only one specimen of *Caulerpa pickeringii* in the collection. It is from Tahiti and was identified by Setchell. It is a much larger and more robust looking plant than B.328 and the rhizomatous portion quite clearly has whorls of ramuli and looks just like one of the upright branches. . . . We have quite a number of specimens of *C. webbiana* and B.328 very closely resembles another one from Tahiti also identified by Setchell, which also lacks ramuli on the rhizomatous parts."

SIPHONOCLADALES

Anadyomene wrightii Gray.

Gray, J. E.: *Jour. Bot.*, vol. 4, p. 48, Pl. 44, Fig. 5.

Agardh, J.: *Till. Alg. Syst.*, Section 8, Siphoneae, p. 124.

Börjesen: *Mauritius Algae* 1, Chlorophyceae, p. 32.

Okamura: *Icones of Japanese Algae*, vol. 1, p. 198, Pl. 40, Fig. 1—6.

Lighthouse rocks, Ponta Abril.

The Inhaca plants agree well with the published descriptions of *Anadyomene wrightii* and with herbarium specimens of this species at the British Museum (Natural History) and Kew.

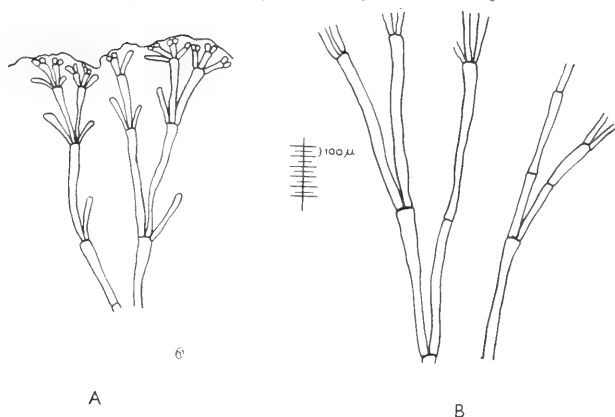


Fig. 7—*Anadyomene wrightii* Gray. (B. 300.)
Diagrammatic representation of "venation", A in upper and B in lower part of frond.

Radiating from the base of the frond may be seen what might be described as veins consisting of linear elongate segments, several times longer than broad. From each of these veins arise radiating cylindrical branches. *A. wrightii* is characterised by the elongation of only some of these (Fig. 7). To quote from Gray's original description: "... joints linear elongate, several times longer than broad, with a radiating group of cylindrical branches at the tip, two to four of which are longer than the rest and proliferate at the tip." This feature is well brought out in the figures and descriptions of both Börgesen and Okamura and is very clearly seen in the Inhaca plants.

J. G. Agardh describes this species as belonging to the "submonostromaticis" group of *Anadyomene*. The Inhaca plants are clearly distromatic (Fig. 8) but as both Börgesen and Okamura also show this plant to be distromatic, the apparent discrepancy with Agardh can be disregarded for the present.

***Dictyosphaeria cavernosa* (Forssk.) Börg.**

Sub-nom *Ulva cavernosa*.

Forsskål: *Flora Aegyptiaco-Arabica*, p. 187.

Sub-nom *Dictyosphaeria favulosa*.

Börgesen: *Marine Algae Danish West Indies*¹. Part 1, p. 33.

Sub-nom *Dictyosphaeria cavernosa*.

Börgesen: *Dansk Bot. Arkiv*. vol. 8, nr. 2, P. 2.

Ponta Abril, Santa Maria.

¹Referred to subsequently as *Marine Algae D.W.I.*

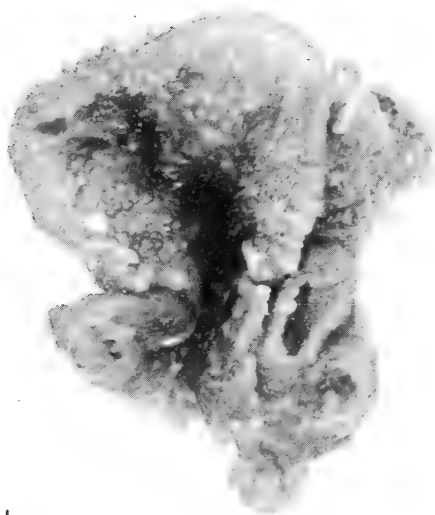


Fig. 1—*Dictyosphaeria cavernosa* (Forssk.) Börg. (B. 322)

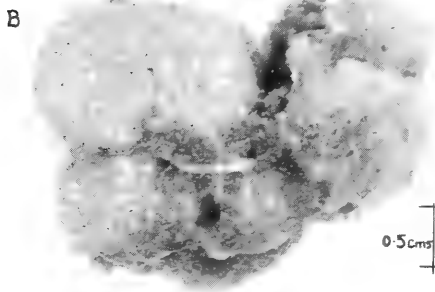
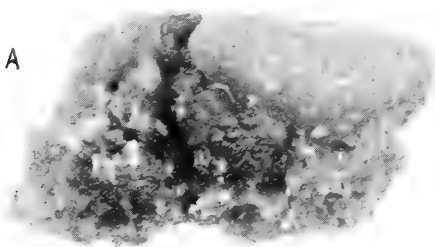


Fig. 2—*Dictyosphaeria versluisii* Weber-van Bosse. A. Side view. B. From above.
(B. 321.)

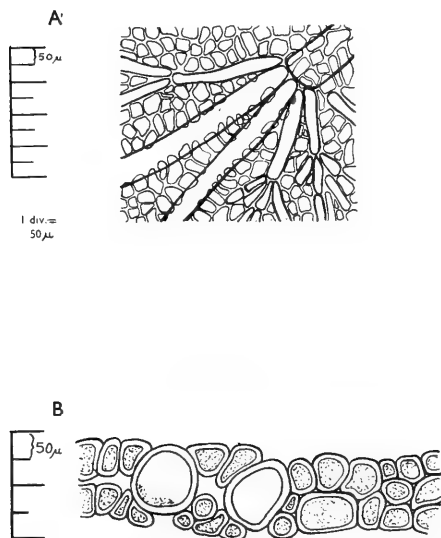


Fig. 8—*Anadyomene wrightii* Gray. (B. 300.)

- A. Portion of frond highly magnified showing cortical cells and the overlapping of the main filaments by them.
B. Transverse section of frond.

The material examined agrees essentially with the published accounts of this species. (Pl. III, Fig. 1).

The "cell" or segment diameter of the Inhaca plants ranges from 300 μ to 1,820 μ and the walls are devoid of spicules.

Dictyosphaeria versluysii Weber-van Bosse.

(Weber van Bosse: *Nuova Notarisia*, vol. 16, p. 142).

Börjesen: *Marine Algae from Mauritius*, 1, p. 13.

Santa Maria, Ponta Abril, West coast beach behind coral reef.

This plant occurs as solid, irregularly lobed globose bodies of from 1—3 cms. in diameter and 1—1.5 cm. thick. They are attached to the substrate by rhizoids. (Pl. III, Fig. 2).

The following three characters have been used in the delimitation of species of *Dictyosphaeria*.

- (1) The general morphology of the plant.
- (2) The diameter of the segments.

- (3) The presence or absence (and size when present) of intra-segmental spines.

B.252, B.268, B.321 from Inhaca most closely resemble *D. versluysii* Weber van Bosse and *D. setchellii* Börg. These species are contrasted by Börgesen (1940, p. 13) as follows:—

	Spines		
	Diameter of "cells"	Length	Breadth at base
<i>D. setchellii</i>	800—1,000—1,500 μ	ca. 70—140 μ	ca. 9—15 μ
<i>D. versluysii</i>	up to 2,000 μ	ca. 130—150 μ	ca. 30 μ

In describing material from Tutuila Island, Setchell describes the spines of *D. versluysii* as being less than 85 μ (Setchell, 1924) and for plants from Revillagigedo Islands the length of spines is given as up to 320 μ (Setchell and Gardner, 1930). Thus spine dimensions do not seem to afford a very reliable character.

The following dimensions were obtained for Inhaca material:—

	Spines		
	Diameter of "cells"	Length	Breadth at base
	700—2,000 μ	36—138 μ	12—33 μ
	with the majority in the 1,000—1,400 μ range		

It can be seen that the material under consideration overlaps into both *D. setchellii* and *D. versluysii* as defined by Börgesen with perhaps a tendency to closer agreement with *D. setchellii*. Egerod (1952) considers that both these taxa together with *D. van-bosseae* Börg. and *D. australis* Setchell should probably be considered as forms of the one species *D. versluysii* since the differentiation of these taxa from one another is based on size differences of body segments and trabecular spines. Such characters are apt to be very variable and a considerable range has been included by different authors under *D. versluysii*. The intermediate character of B.252, B.268 and B.321 between *D. setchellii* and *D. versluysii* as defined by Börgesen (1940) supports this view.

Egerod recommends that further collections of these forms should be examined before *D. van bosseae*, *D. setchellii* and *D. australis* are sunk in the one species *D. versluysii*. Tentatively, the permanently solid Inhaca plants of *Dictyosphaeria* with intra segmental trabecular spines are included under *D. versluysii*.

Examples were noted of unequally bifurcating spines although most of the spines are straight. The spines are transversely striated, suggesting successive depositions of spine wall material.

Dictyosphaeria versluysii was collected by Dr. Robert J. Rodin (May 1948) at Kosi Bay on the border between the Union of South Africa and

Portuguese East Africa. The record was published by Papenfuss and Egerod together with some account of the Union plants (Papenfuss and Egerod, 1957) but insufficient details are given for comparison with the Inhaca plants. It is pointed out, however, that in the South African plants the intra-segmental spines occur only in the segments towards the base of the plant. In this respect the Kosi Bay specimens present a contrast to the Inhaca plants.

While *D. versluysii* is common on Inhaca Island and on the east coast of the Inhaca Peninsula, it seems to be absent or rare at Xai-Xai, about 80 miles due north of Lourenço Marques.

Siphonocladus tropicus (Crouan) J. Agardh.

Sub-nom *Apjohnia tropica*.

Crouan in Mazé et Schramm., *Alg. Guadel.*, p. 105.

Sub-nom *Siphonocladus tropicus*.

Agardh, J.: *Till Algernes Systematik*, Section 8, p. 105.

Egerod: *Univ. Calif. Publ. Bot.*, vol. 25, No. 5, p. 356, Pl. 30.

Santa Maria.

Although the plants collected are of small size they show the characteristic features of *S. tropicus* (Fig. 9).

There are: (a) multiseriate internal segments,

(b) numerous branches which arise around the entire circumference,

(c) Prominent annular constrictions.

Börgesen (1946, p. 14; 1951, p. 5) records the species from Mauritius and comments on the phyto-geographical interest of the record. It has chiefly been recorded from the Pacific and Atlantic oceans, especially the latter. As far as I am aware this is only the second record for the Indian Ocean.

Struvea anastomosans (Harv.) Piccone.²

Sub-nom *Cladophora anastomosans*.

Harvey: *Phycologia Australica*, vol. 2, Pl. 101.

(Harvey: *Trans. R. I. Acad.*, vol. 22, p. 565).

Sub-nom *Struvea anastomosans*.

(Piccone, A.: *Alghe in D'Albertes, Crociera del Corsaro alle Isole Madera e Canarie*, p. 20).

Egerod: *Univ. Calif. Publ. Bot.*, vol. 25, No. 5, p. 359, Pl. 31.

Sub-nom *Struvea delicatula*.

Kützing: *Tab. Phyc.*, vol. 16, Pl. 2, p. 1.

Lighthouse rocks, Ponta Abril.

² Cited by Egerod (1952) as *Struvea anastomosans* (Harv.) Picc. et Grun. ex Piccone.



Fig. 9—*Siphonocladus tropicus* (Crouan) J. Agardh. (B. 374.)

- A. Young, unbranched filament.
- B. Young filament showing early stages of branching.
- C. Older, branched filament.



Fig. 1—*Struvea anastomosans* (Harv.) Piccone (B. 297). A. General Habit. B. Portions showing detail.

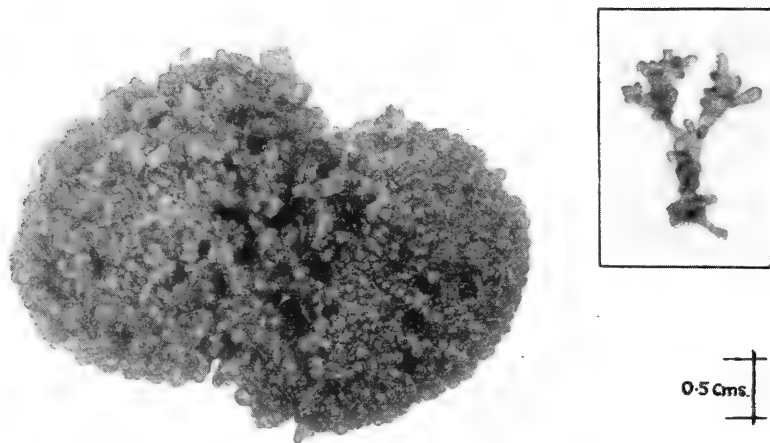


Fig. 2—*Valonia aegagropila* C. Agardh. (B. 296). Inset: A single branched filament.

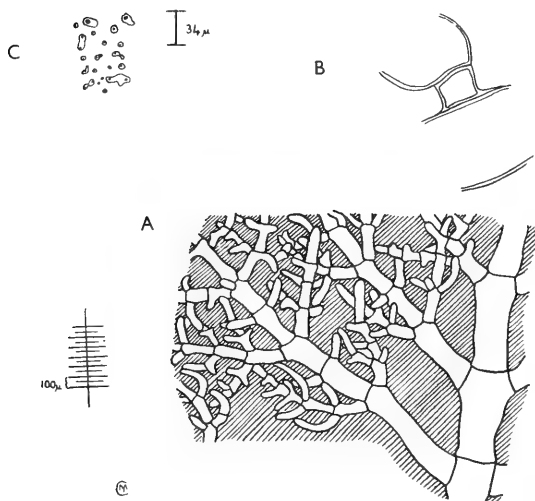


Fig. 10—*Struvea anastomosans* (Harv.) Piccone (B. 297.)

- A. Detail of portion of frond.
B. Hapteroid anastomosis.
C. Chloroplasts.

The plants examined were from 1 to 3 cms. tall and had a relatively long stipe arising from a rhizoidal base. The stipe terminates in a frond which is mostly tripinnate and strongly incurved (Plate IV, Fig. 1). The frond segments anastomose frequently showing typical hapteroid connections (Fig. 10). The stipe lacks annular corrugations which *inter alia* demarcates it from other species of *Struvea* (Egerod, 1952).

This species occurs fairly frequently in the Inhaca region in dense mats intimately mixed with many other species such as small corallines and *Ceramium*.

Valonia aegagropila C. Agardh.

Agardh, C. A.: *Species Algarum*, vol. 1, Pt. 2, p. 429.

Egerod: *Univ. Calif. Publ. Bot.*, vol. 25, No. 5, p. 348, Plate 29 B.

Taylor: *Plants of Bikini*, p. 41.

On west coast of Saco ("Scolopendrina Cove").

The plants of this species occur as more or less compact balls of radiating sub-clavate filaments (Plate IV, Fig. 2). The filaments are branched, the branches forming coenocytic segments (Fig. 11).

The young balls are compact and solid but the filaments tend to fall

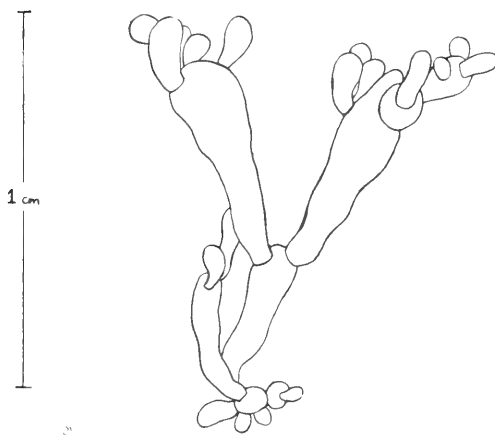


Fig. 11—*Valonia aegagropila* C. Agardh.
Isolated filament from a young ball.

apart from one another to a greater or lesser extent in the older balls. Balls of up to 6 cm. diameter and about 2.5 cms. high were examined.

The segments of the plant are turgid but collapse if pricked. The chloroplasts form a layer under the plant wall.

In older specimens the early development of branches is clearly seen to be the same as described by Börgesen for *Valoniopsis*, with first a dark area appearing on the wall of a segment which grows to form a dark pimple-like structures (Börgesen, 1934.). Thereafter elongation occurs with the contents becoming concurrently lighter in colour. The type of branching, however, is unlike that of *Valoniopsis* (Börgesen, 1934; Isaac, 1957).

The plants occur abundantly among the lower parts of *Cymodocea rotundata* and *C. serrulata*. Brittle stars (*Ophiocoma scolopendrina* and especially *Ophiactis savignyi*) are abundant among the branches of *Valonia aegagropila*.³

Løvring recorded *Valonia aegagropila* for the coast of Natal, at Durban (Løvring, 1938). Subsequently Silva (1951) showed that the material identified by Løvring as *Valonia aegagropila* is a new species of *Codium* (*C. megalophysum* Silva) with very large utricles. It is thus uncertain whether *Valonia aegagropila* occurs on South African coasts.

³ Thanks are due to Dr. Margaret Kalk for this information (see also, Balinsky 1957).

Valoniopsis pachynema (Mart.) Börg.

See Isaac, "Xai-Xai Algae", P.85.

Santa Maria, Ponta Abril, Lighthouse Rocks.

Plants of this species were collected by Papenfuss and Pocock near St. Lucia Bay on the northern Natal coast in July 1938 (Papenfuss and Egerod, 1957). Only a few fragmentary specimens were available and thus no detailed account was possible.

DASYCLADALES

Acetabularia mobii⁴ Solms.

Solms-Laubach: *Monograph of the Acetabularieae*, p. 30, Plate 4,
Fig. 1.

Börgesen: *Marine Algae from Mauritius*, 1950, p. 6, Fig. 1.

Egerod: *Univ. Calif. Publ. Bot.*, vol. 25, No. 5, p. 411.

Ponta Abril.

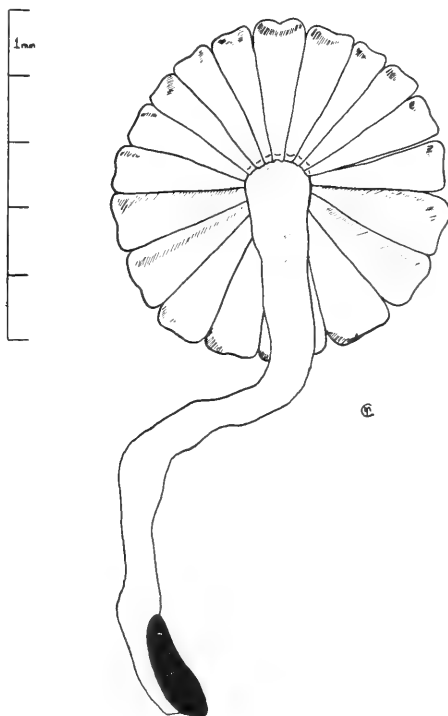


Fig. 12—*Acetabularia mobii* Solms. (B. 311.)

⁴ Rendered *A. moebii* in Börgesen *Mauritius Algae* (1940, p. 44; 1951, p. 6).

Only two specimens collected, one of which is in the Botany Department Cape Town University (B.311) and the other in the British Museum (Natural History).

The plants collected are sterile.

The *Inhaca* material has nineteen more or less closely adherent rays, the apices of which are emarginate (Fig. 12). There is no corona inferior. The coronal knobs of the corona superior are 112μ long and 95μ wide and bear five hair scars in a ring. The disc is about 5 mm. in diameter and the weak stalk is about 9 mm. long.

The plants collected differ from Solms-Laubach's original description in having more than "about 15" rays and in that the rays have emarginate apices. Börgesen (1951) subsequently described specimens from Mauritius with 17 rays and with some of the rays having emarginate apices. Egerod (1952) gives the number of rays for Hawaiian plants as 14—20.

The *Inhaca* plants are larger than those described by Börgesen from Mauritius and by Eubank for Hawaii.

A. mobii was collected near Kosi Bay (May 1948) by Dr. Robert J. Rodin and by Dr. Mary A. Pocock (October 1951) at Hibberdene on the South Natal coast (Papenfuss and Egerod, 1957). This species would seem to be of similar dimensions both on the east coast of the Union and at *Inhaca*.

Dasycladus ramosus Y. Chamberlain.

See paper by Chamberlain (1958).

This species is widely distributed on both *Inhaca* Island and Peninsula. It is a prominent rock pool species.

PHAEOPHYTA

ECTOCARPALES

Ectocarpus irregularis Kütz.

Kützling: *Phycologia Germanica*, p. 234.

Tab. Phyc., vol. 5, p. 19, pl. 62, fig. 1.

Börgesen: *Marine Algae from the Canary Islands*, Pt. 2, p. 25.

Börgesen: *Mauritius Algae*, Pt. 2, p. 23.

On sand at about mid tide level, west coast of *Inhaca* Island.

Inhaca plants of B.242 come within the range of variation of the polymorphic species *Ectocarpus irregularis* as conceived by Börgesen (1941) especially as the comprehensively conceived species includes the former species *E. coniferus* Börg., described as a new species from the Danish West Indies (Börgesen, 1914).

The Inhaca material is irregularly and profusely branched. The cells of the main filaments are up to 30μ broad and except in meristematic regions one to two times as long as broad. The filaments are somewhat narrower at the base. The filaments taper out at their upper ends into long thin cells about 10μ broad and up to 100μ or so long. Meristematic regions occur throughout.

In the lower cells, the chromoplast is an irregular net-like structure. There are one or more dense chromoplasts in the long cells of the main axes.

No unilocular sporangia were observed but the material examined bore numerous plurilocular sporangia. These structures arise singly or in short series on the upper (adaxial) side of the branches. The latter condition recalls that figured for West Indian material described under the name of *E. coniferus* except that the West Indian material bore longer

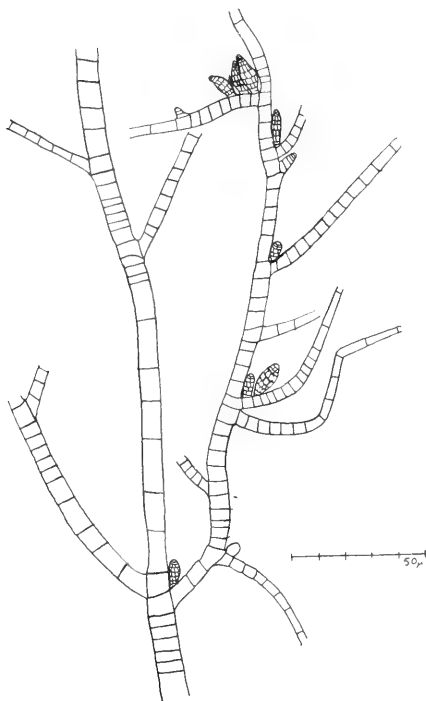


Fig. 13—*Ectocarpus irregularis* Kütz.

series of plurilocular sporangia (Börgesen, 1914, p. 9). Börgesen (1941) pointed out that subsequently Sauvageau (1933) described forms of *E. irregularis* with short rows of sporangia at the base of branches. A single sporangium or the first sporangium of a row, arises on the basal or first cell of a branch (Fig. 13). Sporangia also occur on the main filaments.

The sporangia are usually sessile but occasionally have a short stalk. In form they are ovate-lanceolate and taper upwards. Measurements are given below of what seemed to be fairly mature plurilocular sporangia.

<i>Width at widest part</i>	<i>Length</i>
30·6 μ	68·0 μ
37·4 μ	95·2 μ
27·2 μ	74·8 μ
30·6 μ	85·0 μ
30·6 μ	81·6 μ

DICTYOTALES

Dictyota pardalis Kütz.

Kützling: *Tab. Phyc.*, vol. 9, p. 16, Pl. 39, fig. 2.

Vickers: *Phyc. Barbadosensis*, Part 2, plate 21.

Ponta Rasa.

The three species *D. volubilis* Kütz., *D. bartayresiana* Lamour. and *D. pardalis* are not well delimited from one another. This is especially true of the two latter species and it has been suggested (Weber van Bosse, 1913, p. 182) that *D. pardalis* is a form of the variable *D. bartayresiana*. Clearly this group of forms needs further critical study and the identification of ISAAC 543 as *D. pardalis* is to be regarded as tentative.

Material B289 and ISAAC 543 although rather more twisted than Vicker's delineation of *D. pardalis*, is less twisted than *D. volubilis* is reported to be. Also the more irregularly dichotomous branching agrees better with *D. pardalis*.

The plant was found growing on sandbanks in sheltered situations. In this locality it also occurs as an epiphyte on *Cymodocea ciliata*.

FUCALES

Cystoseira myrica (Gmelin) J.Ag.

Sub nom *Fucus myrica*.

Gmelin: *Hist. Fucorum*, p. 88, Plate 3, Fig. 1.

Sub nom *Phyllacantha myrica*

Kützling: *Tab. Phyc.*, vol. 10, p. 14, Pl. 37.

Sub nom *Cystoseira myrica*

Agardh, J. G.: *Species, Genera et Ordines Algarum*, vol. 1, p. 222.

Ponta Abril, Lighthouse rocks.

Material of this species from Inhaca was identified by J. Feldmann to whom we are grateful both for his identification and for his comments. Reference to this species at Xai-Xai was made in a previous paper (Isaac, 1957).

C. myrica is very widely distributed: in the east African region broadly interpreted, it occurs in the Red Sea, the Persian Gulf, Madagascar,

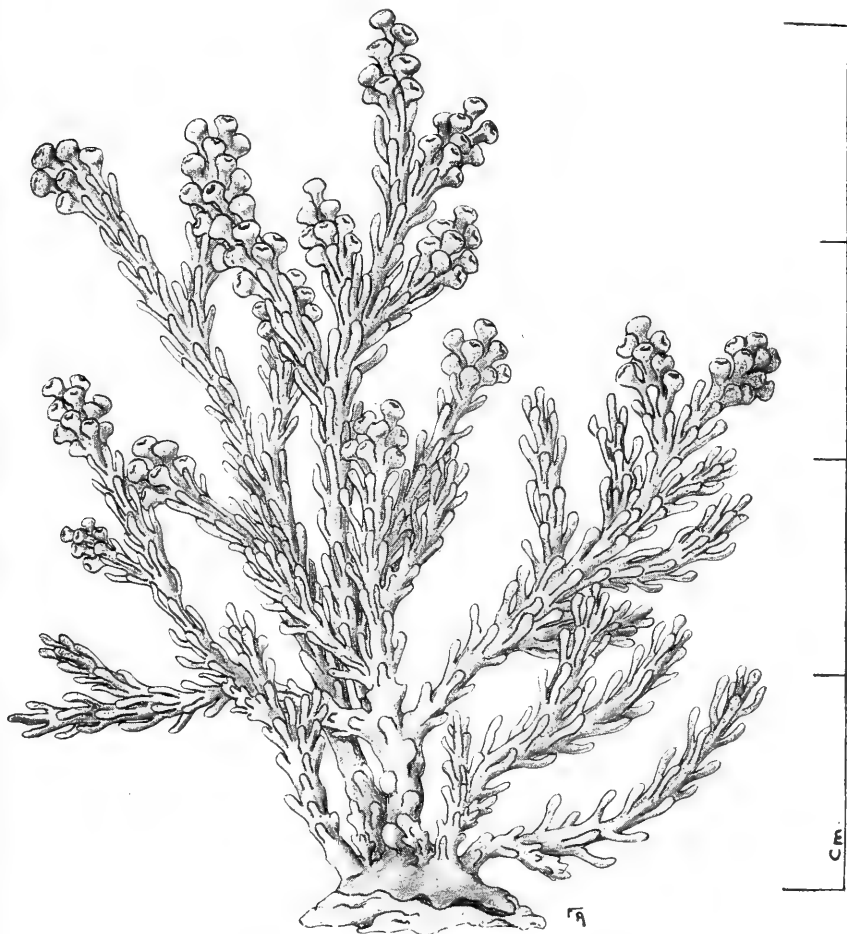


Fig. 14—A form of *Cystoseira myrica* (Gmelin) J. Ag. (B. 267.)

Mauritius and Réunion. In view of this distribution the new records of this species at Xai-Xai and Inhaca are not, as Feldmann remarks, surprising.

More luxuriant sterile material (B.463) of this species but without bladders was collected by Dr. Margaret Kalk in November on the Island of Moçambique which is at about 15°S. latitude. It has also been recorded for the Kenya coast but without information regarding the morphological characteristics of the plants (Lind, 1956).

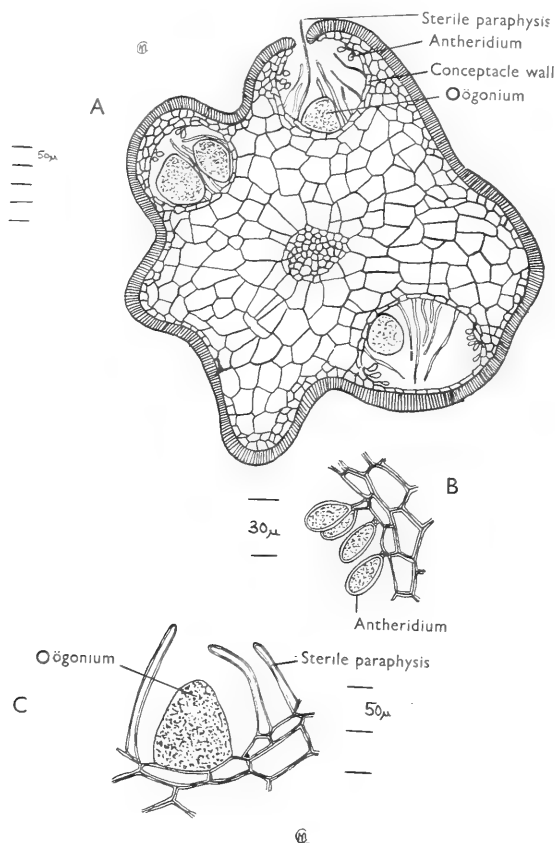


Fig. 15—*Cystoseira myrica* (Gmelin) J. Ag. (B. 267.)

A. Transverse section of receptacle.

B. Antheridia.

C. Oogonium.

Red Sea plants often have bladders (aerocysts) whereas the specimens collected at Inhaca and Xai-Xai are stunted and without bladders (Fig. 14), in which respect the Portuguese East African material examined agrees with specimens from Madagascar, Mauritius and Réunion. The Réunion material was recorded as *Polycladia commersonii* Montagne but Feldmann (private communication) is satisfied that Montagne's specimens correspond perfectly with *Cystoseira myrica*. Feldmann considers that the absence of bladders is not a sufficient basis for delimiting the plants grouped under this species into two distinct species.

Fertile plants with distinctive, clustered receptacles were collected. The conceptacles are hermaphrodite, the oögonia occupying the base and the antheridia the sides of the conceptacle (Fig. 15). The oögonia each contain one ovum; as the basal cell is embedded in the conceptacle wall it is not evident. The antheridia arise singly each having a basal cell.

It occurs at low intertidal levels and in pools.

Sargassum elegans Suhr.

See "Xai-Xai Algae", p. 91.

Lighthouse rocks, Ponta Abril, Santa Maria.

In places (e.g., Lighthouse rocks) at low intertidal levels the rocks are dominated by this alga.

Sargassum heterophyllum (Turn) C.Ag.

See "Xai-Xai Algae", p. 92.

Santa Maria.

FLORIDEAE

NEMALIONALES

Liagora ceranoides Lamouroux var. *leprosa* (J. Agardh) Yamada.

(Lamouroux: *Hist. polyp. corallig. flex.*, p. 239).

Yamada: *Liagora from Japan*, p. 20, Pl. 6.

On west coast of Inhaca to the north of the Estação de Biologia Marítima

The taxon *L. ceranoides* as understood by Yamada includes *L. pulverulenta* of C. A. Agardh (*Spec. Algar.*, vol. 1, p. 396) and *L. leprosa* of J. G. Agardh (*Alg. Liebm.*, 1847, p. 8). Fuller references will be found in Yamada's paper. Yamada points out in his monograph that plants assigned by earlier authors to *L. pulverulenta* were almost always characterised by the presence of numerous short ramuli arising at about right angles to the axes bearing them while plants assigned to *L. leprosa* lack such branches and are usually pale in colour. On the basis of these characters he distinguishes two varieties of *L. ceranoides*—var. *pulverulenta* (Agardh) Yamada and var. *leprosa* (J. Agardh) Yamada.

The material of *L. ceranoides* here dealt with corresponds to var. *leprosa* since it is pale in colour and ramuli or proliferations are very rare.

This plant was found growing attached to stones scattered over a sandy beach. When the tide is out the plants collapse into white or very pale pink untidy masses of fine branches which masses are somewhat soapy to the touch. On close examination the tips of the branches are seen to have a deeper pink or reddish colour. When spread out (Plate V) the repeated dichotomous branching of the plant can be seen, the branching being much denser at the distal end.

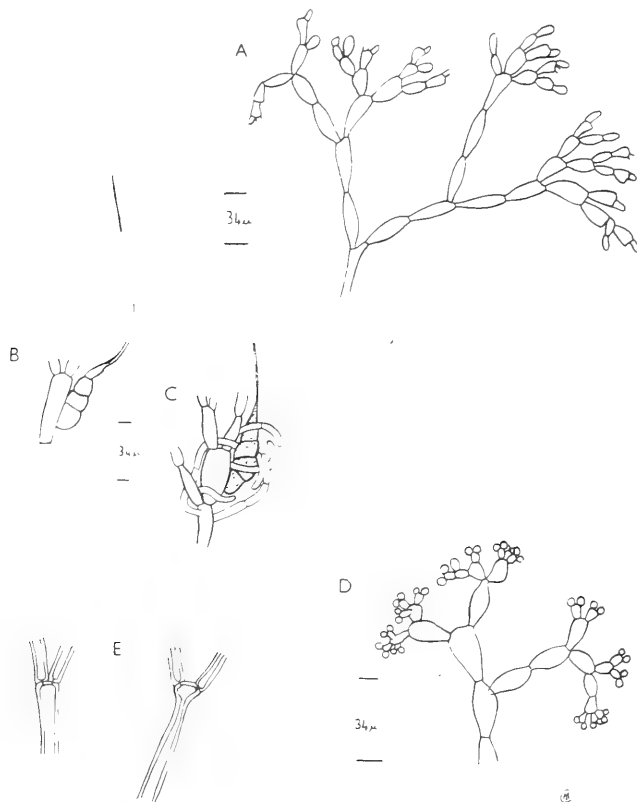


Fig. 16—*Liagora ceranoides* Lamouroux var. *leprosa* (J. Agardh) Yamada.

- A. Assimilating filaments.
- B. Carpogonial branch.
- C. Enveloping threads developing around carpogonial branch.
- D. Antheridia.
- E. Joints of central filaments.



Lingoni ceratoides Lamouroux var. *leprosa* (J. Agardh.) Yamada. (Isaac 658.)

PLATE V.



Fig. 1—*Liagora valida* Harv. (B. 286).



Fig. 2—*Laurencia obtusa* (Huds.) Lam. var. *rigidula* Grunow. (Isaac 801).

The material collected is fertile. Structural characters of the antheridial and carpogonial branches as well as some vegetative features are illustrated in Fig. 16.

***Liagora valida* Harv.**

Harvey: *Nereis Bor. Am.*, Pt. 2, p. 138, Pl. 31A.

Börgeesen: *Marine Algae D.W.I.*, Pt. 3 (1), p. 70.

Börgeesen: *Mauritius Marine Algae*, Additions, 1949, p. 26.

Lighthouse rocks, Ponta Abril.

The plants are about 6 cm. high, erect and rigid, due to marked incrustation of lime. They are repeatedly branched. The width of the branches varies but little throughout, being about 1—1.5 mm. in the upper parts and 1.5—2.0 mm. at the base (Pl. VI Fig. 1). The tips of the branches are red, but below, the plant is white with a rosy tinge. In the upper parts the chalky incrustation has numerous fine uncalcified areas which mark the position of projecting filaments. The calcified layer of the lower parts is thick but often cracked.

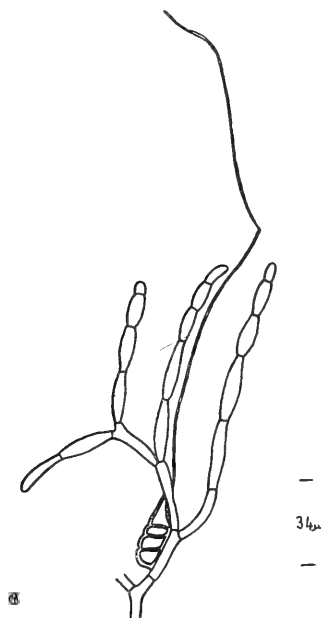


Fig. 17—Carpogonial branch of *Liagora valida* Harv.

In structure the plant consists of numerous central filaments which are $20-30\mu$ wide with thick walls. From these central filaments dichotomously branched assimilatory filaments arise which are $160-170\mu$ long in the upper parts of the plant. In the upper parts, the cells of these assimilatory filaments are fairly long and narrow but are more barrel shaped in the lower parts.

In the parts examined only female reproductive organs were found. The carpogonia are situated laterally on the lower cells of the assimilatory filaments and consist of three to five cells. They are more or less curved and have a very long trichogyne, about twice the length of the assimilatory filaments (Fig. 17). Enveloping threads grow around the developing carpogonium which has a diameter of about 130μ .

CRYPTONEMIALES (Corallinaceae)

Cheilosporum cultratum (Harv.) Aresch.

See "Xai-Xai Algae", p. 93.

Lighthouse rocks.

Corallina cubensis (Mont.) Kütz. emend Börg.

Sub nom *Jania cubensis*.

(Montagne: *Sylloge gen. specierumque Cryptogamarum*, p. 429).

Kützling: *Species Algarum*, p. 709.

Sub nom *Corallina cubensis*.

Kützling: *Tab. Phycol.*, vol. 8, p. 37, Pl. 77, Fig. 2.

Börgesen: *Marine Algae D.W.I.*, Pt. 3 (3), p. 187.

Ponta Rasa.

Specimens B.394 agree in all respects with Börgesen's lucid description of an old and badly described species of Montagne which did in fact turn out to be based on a mixture of two different genera. One of the authors (Miss Yvonne Chamberlain) compared the Inhaca material with Börgesen's specimens from St. Jan in both the British Museum and Kew Herbaria and found the correspondence to be exact in size as well as all other characteristics. Börgesen's material was found growing on rocks and corals whereas the Inhaca plants were epiphytic on *Cymodocea*. Several of the British Museum specimens, however, were epiphytic on such plants as *Digenea simplex*.

As described by Börgesen, the plant branches very irregularly and the untidy appearance is accentuated by unequal development of the branches, some of which are very slender (Fig. 18). The specimens collected at Inhaca in July appear to be sterile.

In the British Museum Herbarium there are specimens of this species from the following localities: Jamaica, Cuba, Florida, St. Jan, Mexico, St. Vincent, Fernando de Noronha, Guadeloupe, Antilles, Bahamas. The



Fig. 18—*Corallina cubensis* (Mont.) Kütz. emend Börg. (B. 394.)

Inhaca record thus affords a considerable and interesting extension of the geographic range of *Corallina cubensis*.

***Jania intermedia* Kütz.**

See "Xai-Xai Algae", p. 93.

Lighthouse rocks, Ponta Abril.

GIGARTINALES

***Catanelia opuntia* (Goodenough et Woodward) Greville.**

Sub nom *Fucus opuntia*.

Goodenough and Woodward: *Linn. Trans. III*, p. 219.

Sub nom *Catanelia opuntia*.

Greville: *Algae Britannicae*, p. 166, Pl. 17.

Börgesen: *Marine Algae D.W.I.*, Pt. 4 (5), p. 359, Fig. 354.

Saco, Ponta Punduini.

This plant (Fig. 19) forms dense mats with *Bostrychia* on *Rhizophora* roots. It also occurs, again often with *Bostrychia*, at high intertidal levels in shady places under rock overhangs.

***Gracilaria crassa* Harv. forma *conglomerata* Börg.**

Börgesen: *Mauritius Marine Algae*, Additions 4, p. 34.

Lighthouse rocks.

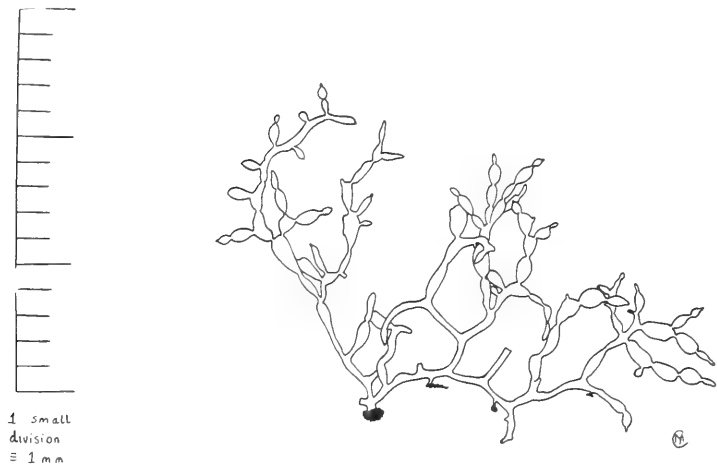


Fig. 19—*Catanella opuntia* (Goodenough et Woodward) Greville. (B. 387.)

After careful consideration and deliberation Börgesen (*Mauritius Algae*: 1943, 1950, 1951, 1952) came to the conclusion that plants named *Coralloopsis opuntia* and *Gracilaria crassa* belonged to one species and he agreed with Linda Newton (letter) that the species should be named *Gracilaria crassa* (Börgesen, 1952, p. 33). Of this species he described and illustrated the new form, *conglomerata* from Mauritius. *Forma conglomerata* was collected at Inhaca (B.387; Fig. 20).



Fig. 20—*Gracilaria crassa* Harv. forma *conglomerata* Börg. (B. 381.) Natural size.

The upright form of the species was recorded in Marine Algae of Inhaca under the name of *Coralloopsis opuntia* J.Ag.

***Hypnea rosea* Papenfuss.**

See "Xai-Xai Algae", p. 98.

Lighthouse rocks (epiphytic on *Cymodocea ciliata*).

CERAMIALES

Acanthophora muscoides (L.) Bory.

Sub nom *Fucus muscoides*.

Linnaeus: *Species Plantarum* 2, p. 1161.

Sub nom *Acanthophora muscoides*.

(Bory in Duperry: *Voyage autour du Monde sur la Coquille*, p. 156.)

Sand flats to north of marine station, west coast of Inhaca; Ponta Abril; Lighthouse rocks; "Saco"; Ponta Rasa.

Inhaca material of this species is illustrated in Figs. 21 and 22. Although the number of described species of *Acanthophora* is relatively small, the descriptions are very often so inadequate that the taxonomy is in considerable confusion. It seems that most of the species have been described from dried material. This is unsatisfactory. Dried Inhaca

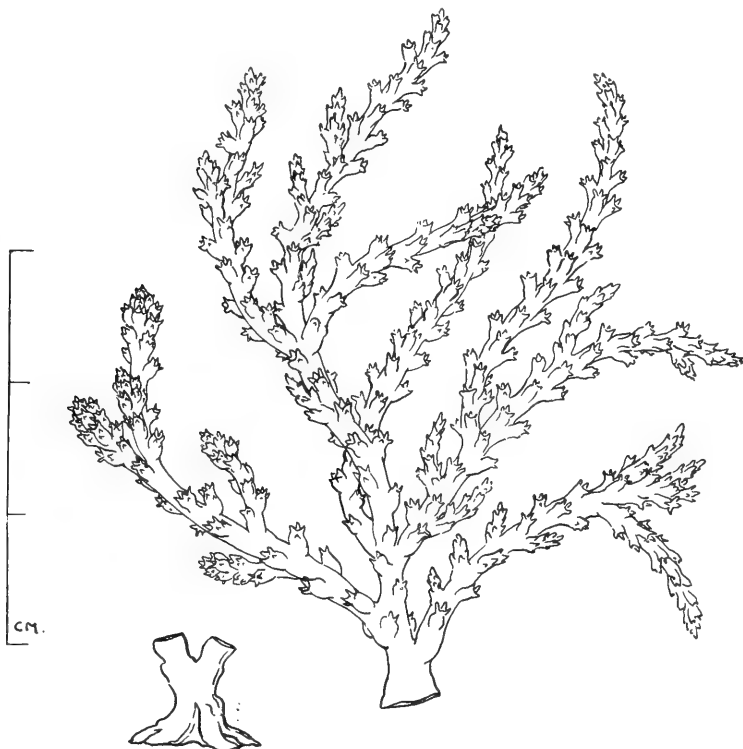


Fig. 21—*Acanthophora muscoides* (L.) Bory. (B. 367.)

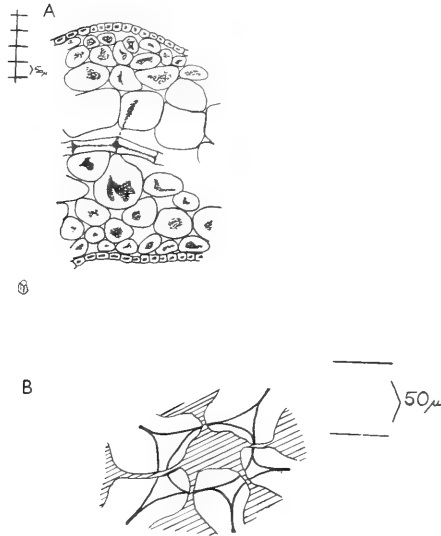


Fig. 22—*Acanthophora muscoides* (L.) Bory.
 A. Longitudinal section showing central filament.
 B. Central filament in transverse section. Semi-diagrammatic.

plants when soaked out do not become restored to the size of preserved *Inhaca* material and the general form seems somewhat changed also.

The species greatly resemble one another in vegetative morphology and cannot satisfactorily be identified in the vegetative state. Fortunately *Inhaca* material B.367 is cystocarpic.

According to de Toni (1903, p. 818) the genus is divided into two groups: one group in which plants bear spines on the main axis and a second group in which the spines occur on side branchlets. Plants of B.367 have spines on the main axis but they are rare except in the youngest parts from which it might be inferred that most of them subsequently develop into branchlets. What seem to be stages in such a development can be observed. The few spines on the older parts of the main axis indicate that the plant belongs to the *muscoides*, *delilei*, *dendroides* group.

The cystocarps are sub-globose with wide terminal openings when ripe (Fig. 23). They occur on the side branchlets—sometimes terminally, sometimes laterally. Nearly all species of *Acanthophora* have urn-shaped cystocarps and indeed no description of an *Acanthophora* with sub-globose cystocarps has been found. In Kützing's *Tabulae Phycologicae* (vol. 15, p. 27, Pl. 76), there is a drawing of *Acanthophora ramulosa* (Lind.) Kütz.



Fig. 23—Branchlet and cystocarps of *Acanthophora muscoides* (L.) Bory. M, main axis.

which has sub-globose cystocarps. The plant on which this drawing is based was found by Lindenberg on the coast of Angola and is probably the same taxon as that of Inhaca. *A. ramulosa* was sunk by de Toni (1903, p. 818) in *A. muscoides*.

The general form of the plant agrees quite well with W. R. Taylor's figures (Taylor, 1928, p. 165, Pl. 26, Fig. 7; Pl. 34, Fig. 9) but not so well with those of Okamura (1907, p. 38, Pl. 8). The following were consulted by one of us (Chamberlain) but were not found helpful: Lamouroux's *Essai*, Howe in Britton and Millspaugh's *Bahama Flora* and Harvey in *Nereis Boreali Americana* (Part 2, p. 18, 1853) sub nom. *A. delilei*.

A comparison of the Inhaca material was made with specimens of *A. muscoides* in the British Museum Herbarium and the Inhaca material was found to bear a close resemblance to a specimen of Börgesen's from Mauritius which does not seem to have been dealt with in Börgesen's monograph on Mauritius Marine Algae. Börgesen does, however, describe *A. muscoides* from the Danish West Indies and describes the cystocarps as being ovate—urnshaped (Börgesen, 1918).

To sum up. The Inhaca material of this plant (B.367) is named *Acanthophora muscoides* (L.) Bory because the general appearance of the plant agrees quite well with this species and because of the resemblance of the cystocarps to those of *A. ramulosa* (Lind.) Kütz. which has been sunk in this species.

It is recognised that further work on the genus *Acanthophora* might well result in *A. ramulosa* being re-instated to specific rank.

Centroceras clavulatum (Ag.) Mont.

Agardh, J.: *Species Genera et Ordines Algarum* vol. 2, Pt. 1, p. 148; *Epicrasis*, p. 108.

(Montagne: *Exploration scientifique de l'Algeria, Algues*, vol. 1, p. 140). Santa Maria.

Laurencia natalensis: Kylin.

Kylin: *Rhodophyceen von Südafrika*, p. 24, Pl. 8, Fig. 21.

Ponta Abril, Santa Maria, Lighthouse rocks.

This species is prominent in a living condition due to its bright reddish short globose branches.

Börgesen does not regard this taxon as being of specific rank but styles it *Laurencia obtusa* (Huds.) Lamour. var. *natalensis* (Kylin) Börg. (see Börgesen, 1945, p. 59).

This species is mostly found on rocky substrata somewhat above the lowest intertidal levels.

Laurencia natalensis is widely distributed on the east coast of the Union and extends westwards along the south coast.

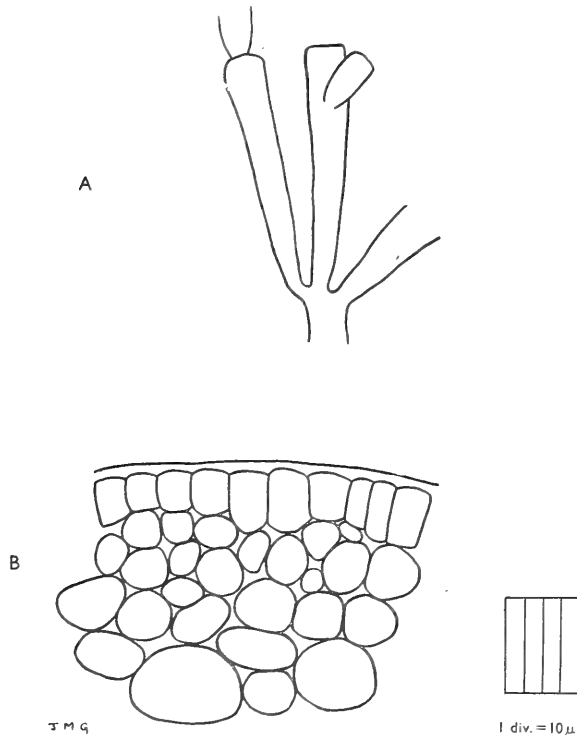


Fig. 24—*Laurencia obtusa* (Huds.) Lam. var. *rigidula* Grunow.
A. Showing increase in diameter from base upwards of branches.
B. Transverse section.

Laurencia obtusa (Huds.) Lamour var. *rigidula* Grunow.

Grunow: *Jour. Mus. Godeffroy*, vol. 6, p. 45.

Börjesen: *Marine Algae of Mauritius III*, Pt. 4, p. 58.

Ponta Abril, Santa Maria, Lighthouse rocks.

The material collected (Pl. VI, Fig. 2) is up to about 4 cm. high although mostly it does not exceed about 3 cms. It is of a dark red or very dark greenish colour and mostly occurs in dense clumps of rigid fronds. The branches arising from the main axes are short and show a characteristic gradual increase in diameter from the base upwards (Fig. 24A). In transverse section (Fig. 24B) the absence of a clear palisade-like epidermis is to be noted. The inner cells vary greatly in size but there is, in contrast to what was observed by Börjesen for Mauritius plants (1945, Fig. 35), a tendency for cell size to increase inwards. As with Börjesen's material the largest cells noted have a diameter of about 50μ and there are no particular thickenings.

Laurencia pumila (Grun.) Papenfuss.

Sub nom *Laurencia flexuosa* Kütz. var. *pumila* Grun.

Grunow: *Novara—Algen*, p. 87.

Sub nom *L. pumila*.

Papenfuss: *Jour. S. Afr. Bot.*, vol. 9, p. 91.

Santa Maria, Ponta Abril, Lighthouse rocks.

Inhaca plants of this species agree well with Tyson material so named by Papenfuss in the Herbarium of the British Museum of Natural History. The British Museum material, however, consists of somewhat larger plants collected at Durban.

Tetrasporic plants were collected in July at both Ponta Abril and the Lighthouse rocks.

Superficially the Inhaca plants resemble *Laurencia subcolumnaris* Börgs from Mauritius. The anatomy of the species, however, is different since the Inhaca plants lack the two outer rows of very small cells found in *L. subcolumnaris* (Börjesen, 1954).

This species is common or very common at lower mid tide levels. It is widely distributed in the east coast of the Union.

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Fig. 14 was drawn by Miss Fay Anderson, Fig. 5 and 6 by Mrs. S. M. Simons and Fig. 24 by Miss J. M. Graves to whom we offer our thanks.

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A NEW LITHOPS FROM THE CALVINIA KAROO

By

H. A. LÜCKHOFF
(With Plates VII—X)

Lithops viridis H. Lückhoff sp. nova.

Corpuscula turbiniformia 1.7—4.8 cm. alta, apice 0.8—1.6 cm. lata, 1.1—2.3 cm. longa, fissura 0.8—1.5 cm. alta; folia aequalia vel subaequalia, convexa griseo-viridia; fenestra magna bene visa, pellucida, viridis integra, interdum obscure bullata, bullis glaucis ad 0.1 cm. diam., margine exteriore plano vel minute dentato vel sinuolata, margine interiore plano; sepala ovato-lineariter obtusa, apicem versus granulata, 0.9 cm. longa, basi 0.5 cm. lata; petala in seriebus duabus, 1.6 cm. longa, 0.35 cm. lata, lineariter obtusa aequalia aurea; discus conspicuus crenulatus; stamina columnam compressum, basi 0.6 cm., apice 0.3 cm., filamentis albis, glabris vel in medio papillatis, 0.9 cm. longa, antheris aureis; ovario obscure lobato, lobis leviter compressis, stylo filiformi 1.1 cm. longa, stigmatibus 5; capsula 5-partita, semina minute fusca pyriformia.

Growths usually in clumps of 2 to 4 and occasionally up to 10, turbiniform, lobes generally of more or less equal size and markedly convex, sometimes slightly obliquely convex; plant bodies 1.7—4.8 cm. tall, 1.1—2.3 cm. long and 0.8—1.6 cm. broad, greyish green to olive-green occasionally with pinkish tinge towards upper part and window margin, fissure opening slight, up to 0.2 cm. wide in natural resting stage but tending to widen considerably and up to 1.5 cm., with leaves gaping, in cultivation. Window large covering practically the whole upper surface, bright green to bright olive-green, transparent, frequently obscurely mottled with small, inconspicuous, milky-green islands up to 0.1 cm. in diameter. The occurrence of this mottling is extremely variable, generally it is so slight that plants have to be closely examined to observe it,

frequently it is completely absent and rarely quite pronounced with the markings coalescing to form a hazy marbling or reticulation on the surface. Inner window margin usually entire, straight to slightly curved, outer margin entire to slightly denticulate to wavy. Flowers up to 3 cm. in diameter with peduncle enclosed; sepals nearly equal, 0.9 cm. long and 0.5 cm. broad at base, obtuse, inconspicuously granulated and reddish towards the apex; petals obtuse, in two series and nearly equal in length, golden yellow, white at base, 1.6 cm. long and 0.35 cm. broad tapering to 0.05 cm. at base; stamens in compressed column 0.6 cm. broad at base and 0.3 cm. at apex; filaments 0.9 cm. long, white, glabrous to minutely papillate, anthers golden; ovary 0.6 cm. long and 0.35 cm. broad, obscurely lobed, lobes compressed, style filiform, stigmas five, 1.1 cm. long and overtopping stamens; fruit capsule 0.8 cm. long when closed, seeds minute, pear shaped, dark brown.

Habitat: Between Calvinia and Loeriesfontein in shale ridges. Flowering end of March through April.

Lithops viridis was found by Mr. L. Hill of Cape Town and the writer, during October 1956, growing on the top of a flat kopjie forming an outlier to a low range of mountains and at an estimated altitude of 1,000—1,300 metres. The locality falls within the winter rainfall area of the Cape and has an estimated annual rainfall of 150—200 mm. The plants grow firmly wedged in between solid, parallel, brown shale ridges which generally protrude slightly above the surface of the soil. Frequently these shale ridges are so close together that the individual bodies of a plant have a linear alignment on account of restricted growing space, and sometimes even the two lobes of a body are offset for the same reason. *L. viridis* is a very distinct species and easily recognised by the unusually bright green to bright olive-green colour of the large, smooth, transparent, and generally unbroken window, and the clearly defined practically entire window margins. According to Nel's classification it falls into the sub-group *Arubrae* of the *Fenestrate* and is most closely related to *L. comptonii*, which grows approximately 120 miles to the S.S.E. The main resemblance between *L. viridis* and *L. comptonii* is in the general form of the plant bodies. In both species the two lobes of a body tend to diverge and gape, particularly in cultivation. The characteristic purple-red to brown window colour of *L. comptonii* does not, however, occur naturally in *L. viridis*. Under cultivation at the coast (Cape Town) occasional specimens of *L. viridis* have developed plum-coloured windows and a few plants have also developed scattered, deep purple pigmentation dots, up to 1 mm. in diameter, and imbedded in the plant tissue below the window surface. These characters were not noticed

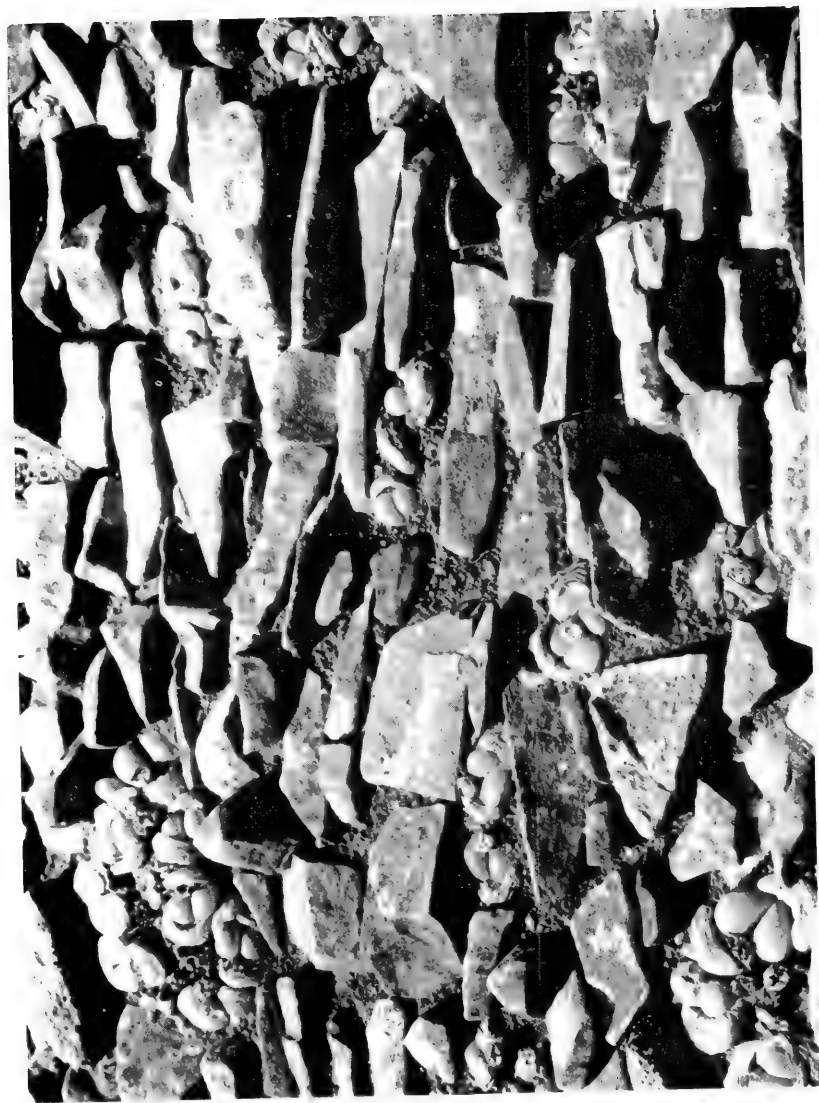


PLATE VII. *Lithops viridis* in natural setting. $\times 1/2$



PLATE VIII. *Lilhops viridis*
Freshly collected veld plants. Natural size.



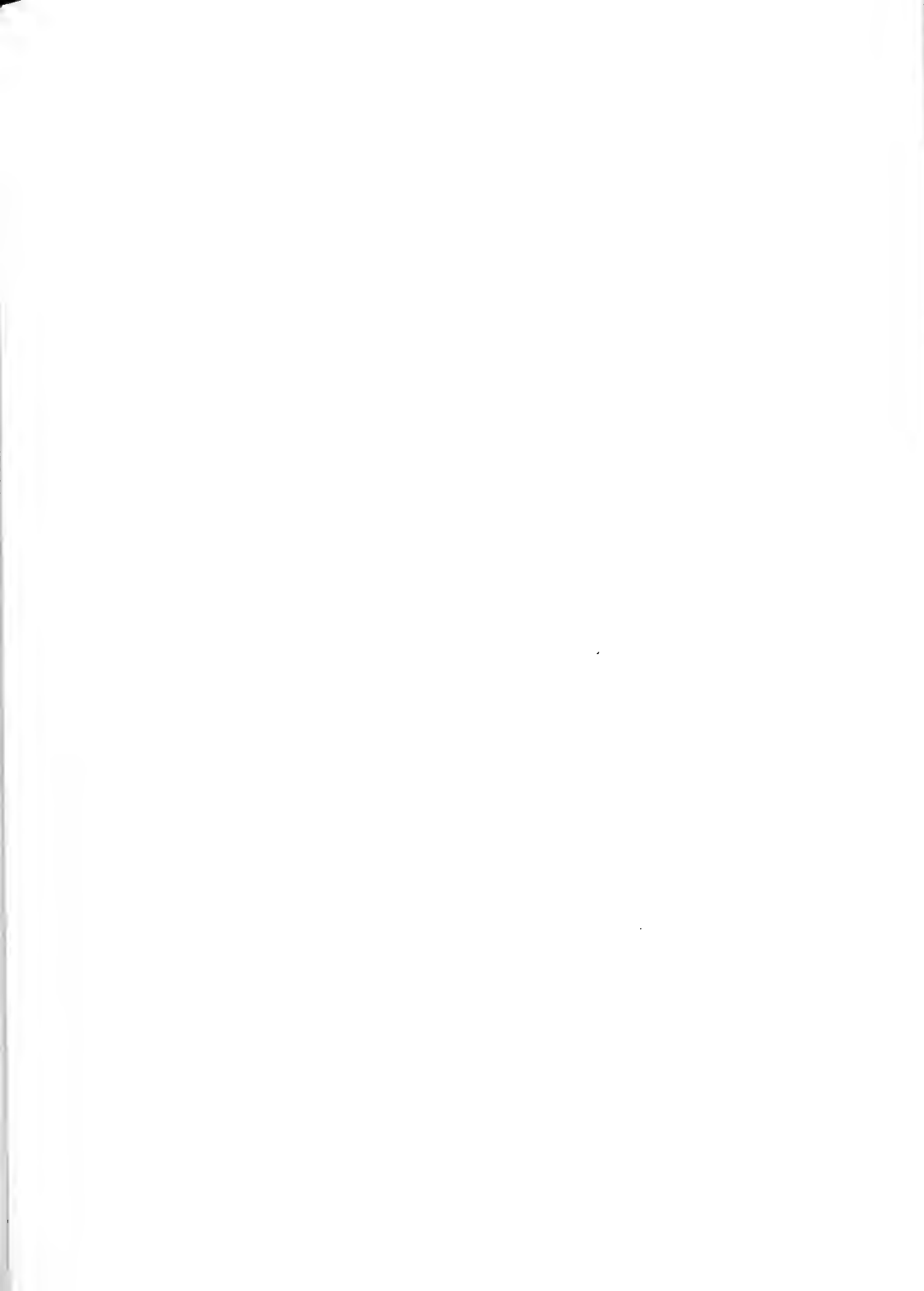
PLATE IX. *Lithops viridis*
showing typical, transparent, well defined window. . . 3



PLATE X. *Lithops viridis*
An extreme case of window mottling. This type of window is rare and
not characteristic. $\times \frac{2}{2}$

in any of the plants at the time of collection and it appears likely that they have been induced by coastal climatic conditions.* In the type specimens, which are currently in cultivation at Pretoria where climatic conditions more closely approach those of the natural habitat of the species, there is no trace of these colour characters. Occasionally, when growing in the shade under bushes, *L. comptonii* develops an olive-green window colour but this is not typical and the green is never as bright as in *L. viridis*. In *L. comptonii* the window is frequently broken up into a large number of confluent, irregularly shaped, whitish islands forming a delicate reticulation on the surface. In *L. viridis* the window is typically unbroken or contains only a few scattered, milky-green islands. In rare cases the window is broken up but then the reticulation is never as delicate as in *L. comptonii*. The outer window margin of *L. viridis* is also generally entire to slightly wavy and not typically finely toothed as in the case of *L. comptonii*. In both *L. viridis* and *L. comptonii* the flower peduncle is enclosed and the petals are prevented from expanding fully in the early stages and rest on the windows. The flowers of *L. viridis*, however, are significantly larger than those of *L. comptonii*. The nearest neighbours of *L. viridis* are *L. villettii*, *L. otzeniana*, *L. divergens* and *L. weberi*, which grow approximately 50 miles to the north, 50 miles to the N.N.W., 75 miles to the N.W. and 90 miles to the S.S.E., respectively. *L. viridis* does not resemble any of these species, either in window colour or pattern, and also grows under completely different soil conditions.

* A more recent visit to the same area revealed that occasional plants do, in fact, bear scattered purple dots [Hall 1380] and were observed both by Hill and Hall in the veld, May, 1958.—Ed.



THE IDENTITY OF *ALOE SOMALIENSIS* WATSON
(SOMALILAND PROTECTORATE), AND OF
A. TOMENTOSA DEFLERS (ARABIA)

By G. W. REYNOLDS

(With Plates XI—XV)

(1) *A. somaliensis* Watson

In 1894–95, Miss Edith Cole (accompanying Mr. and Mrs. E. Lort-Phillips and Mr. F. Gillet Gunnis) undertook a botanical journey from Berbera on the coast of Somaliland Protectorate, southwards to the Golis Range, where they ascended to over 5,000 feet.

Subsequently, in 1899, *Aloe somaliensis* was described by Watson from plants raised at Kew from seeds that had been gathered by Miss Edith Cole on that journey. In the light of present-day knowledge, it seems that the probable locality where Miss Cole collected the seeds was above Sheikh Pass in the neighbourhood of Upper Sheikh.

Apart from a rambling Aloe found in large numbers sprawling over rocks on northern slopes of Sheikh Pass, two other species of Aloe occur near Sheikh Pass and Upper Sheikh.

One of these is a species allied to *A. lateritia* Engler in East Africa, and to *A. macrocarpa* Tod. in Ethiopia and Eritrea, both in the Section *Saponariae*. It has broadly ovate-attenuate “soapy” spotted leaves, and perianths conspicuously inflated at base and much constricted above the ovary.

Because a similar plant had been figured and named *A. somaliensis* in *Missione Biologica nel Paese Dei Borana* 4 : 348, fig. 119 (1938), I had thought that this was the long-sought-for *A. somaliensis*, but it is not. The Borana plant (between Mega and Moyale in Southern Ethiopia) had been wrongly identified.

The second species near Upper Sheikh has rather glossy spotted leaves, and a branched inflorescence with cylindric-trigonous perianths that are not inflated at base, or constricted above the ovary. This is the true *A. somaliensis*, for the following reasons:

In his description of *A. somaliensis*, Watson in *Gard. Chron.* 26 : 430 (1899) refers to the glossiness and conspicuous leaf markings, while Wright in *Kew Bull.* 135 (1901) includes “*folia utrinque vernicosa* . . . Miss Edith Cole 261”.

Material in Kew labelled “Hort. Miss Edith Cole, March 3, 1905”, from a plant that flowered in Kew establishes that the perianths are

cylindric-trigonus—not basally inflated and constricted above the ovary as in the Sect. *Saponariae*. The leaves are glossy and not "soapy".

Mr. P. R. O. Bally and I have independently found a form of *A. somaliensis* near Upper Sheikh, which has rather large leaves, that with age, become marbled rather than spotted. In floral characters they are indistinguishable.

The first to collect plants and to prepare herbarium specimens of *A. somaliensis* appears to be Mr. J. B. Gillett, who found the species on sandstone rocks north of Hargeisa, at 4,300 ft., on 23 Sept. 1932. His No. 3996 (K) is typical.

In August 1952, Mr. C. F. Hemming found the same species about 50 miles north-east of Hargeisa on the road to Berbera.

Mr. Bally has found *A. somaliensis* at Ged Dehti, 20 miles north of Hargeisa, and on Aderiale Hill 5 miles further on, in October 1957. He has also found it near Borama, on the lower part of Fodjor escarpment west of Sheikh, near Upper Sheikh, and on Wagger mountain east of Sheikh.

During my own recent investigations throughout the Protectorate, I found that the largest numbers of *A. somaliensis* occurred 4 miles south-east and 7 miles north-west of Borama, which is 72 miles and 83 miles respectively, west of Hargeisa, at 5,100 ft. and 4,600 ft., flowering in September 1957.

A. somaliensis can now be more fully described, and figured:

A. somaliensis Watson in *Gard. Chron.* 26 : 430 (1899); C. Wright in *Kew Bull.* 135 (1901); Berger in *Monatsschrift f. Kakteenkunde* 14 : 120 (1904) *cum fig.*; in *Pflanzenr. Liliac.-Aloin.* 236 (1908).—Non *Miss. Biolog. Borana* 4 : 348, t. 119 (1939). This is a totally different species in Sect. *Saponariae*.

DESCRIPTION. *Plant* succulent, growing singly or forming small groups. *Stem* none or short.

Leaves 12—16, densely rosulate, usually narrowly lanceolate, spreading to slightly recurved, averaging 20 cm. long, 7 cm. broad at base, 8—10 mm. thick; *upper surface* flat low down, slightly canaliculate upwards, rather glossy brownish green with numerous pale green lenticular spots throughout; *lower surface* convex, paler brownish green than upper surface, and with more numerous, more crowded, sometimes confluent lenticular spots throughout; *margins* sinuate-dentate, the teeth reddish brown, pungent, deltoid, averaging 4 mm. long, 8—10 mm. apart, the interspaces paler; *sap* dries brown.

Inflorescence a branched panicle, 60—80 cm. high, usually produced suberectly to obliquely.



PLATE XI. *Aloe somaliensis* Watson
Upper: Plant 4 miles south-east of Borama, Somaliland Protectorate. Height 70 cm.
Lower: Flowers 1/1 from bud to early fruit stage.

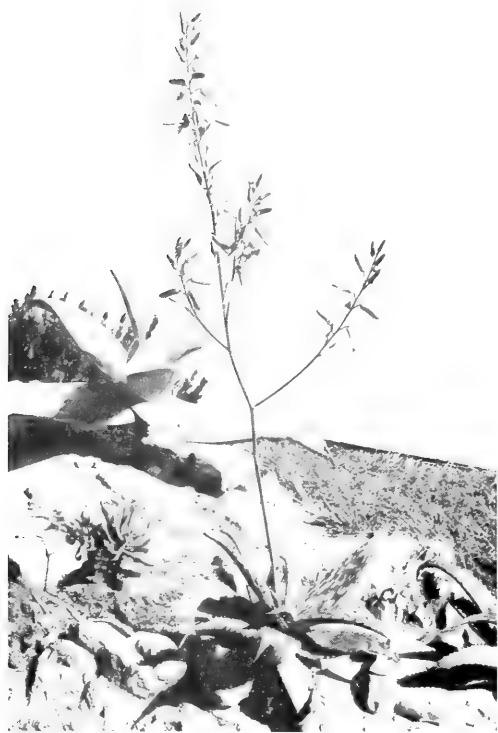


PLATE XII. *Aloe somaliensis* Watson

Upper: Plant collected near Upper Sheikh, flowering in Johannesburg. Height 50 cm.

Lower: Flowers 1, 1 from bud to post-pollination stage.

Peduncle plano-convex and 10—12 mm. broad at base, terete upwards, averaging 5—8-branched from below the middle, the lowest branches sometimes with 1—2 branchlets.

Racemes cylindric, subclaxly flowered, 15—20 cm. long, 5—6 cm. diameter, when erect the flowers evenly distributed around the axis, with youngest buds suberect, older buds horizontally disposed, open flowers nutant; in oblique racemes the flowers usually subsecund.

Bracts ovate-attenuate, about 8 mm. long, 4 mm. broad, thin, scarious, white, many-nerved.

Pedicels the lowest averaging 8 mm. long.

Perianth pinkish scarlet, turning paler after pollination, cylindric-trigonus, 28—30 mm. long, basally flat to obtuse, 9 mm. diameter across the ovary, thence very slightly narrowed on the underside only, slightly narrowed to the mouth, the whole perianth minutely speckled; *outer segments* free for 10 mm., obscurely 3-nerved to base, the apices subacute and slightly spreading; *inner segments* broader than the outer, with a broad pale border and keeled in upper third, the keel the colour of the perianth, the apices more obtuse and more spreading than the outer.

Filaments lemon, the 3 inner narrower and lengthening before the 3 outer with their *anthers* in turn exerted 1—2 mm.

Stigma at length exerted 3 mm. *Ovary* olive-green, 6 mm. long, 3 mm. diameter. (Plates XI and XII.)

SOMALILAND PROTECTORATE: Cult. Kew from seeds gathered by Miss Edith Cole n.261/1895, type (K); Hort. Miss Edith Cole, March 3, 1905, cult. Kew (K); Sheikh, 21 Feb. 1929, E. Burne n.4 (K) probably belongs here. Sandstone rocks north of Hargeisa, 9° 34' N., 44° E., alt. 4,300 ft., fl. 23 Sept. 1932, J. B. Gillett 3996 (K); Sheikh Pass, 4,000 ft., 1 June 1949. Bally 7146 (Cor. Mus. n.21896); Loli Mudeda, 8 miles N.W. of Borama, 4 Oct. 1954, Bally 9669 (Cor. Mus. n.21898); Ged Dehti, 20 miles N. of Hargeisa, 2 Oct. 1957, Bally 11770 (Cor. Mus. n.21901); Aderiale Hill, 25 miles N. of Hargeisa, 2 Oct. 1957, Bally 11784 (Cor. Mus. n.21902); 4 miles S.E. of Borama, 24 Oct. 1957 (Cor. Mus. n.11922); 4 miles S.E. of Borama, 72 miles from Hargeisa, c. 9° 55' N., 43° 12' E., alt. 5,100 ft., 30 Aug. 1957, Reynolds 8363 (K, EA, PRE); 7 miles N.W. of Borama, 4,600 ft., 1 Sept. 1957, Reynolds 8381 (K, EA, PRE).

NATIVE NAME: Mr. J. B. Gillett records that the Somali name is *Daar biyu*, biyu meaning water.

Affinities: The nearest ally to *A. somaliensis* in Somaliland Protectorate is the very small species *A. jucunda* Reynolds, on Gaan Libah.

Very young plants of *A. somaliensis* have small rosettes of leaves resembling those of *A. jucunda* but are larger and have a simple, taller inflorescence. Adult plants with their much larger leaves and much-branched inflorescence could never be confused.

A. mc-loughlinii Christian near Dire Dawa, in Harar Province, Eastern Ethiopia, is another close ally, but differs in having longer, narrower more glossy leaves, a taller more compact inflorescence, and shorter more squat flowers.

(2) *A. tomentosa* Deflers

Mr. Gillett and others have stressed the marked affinity of the flora of Somaliland Protectorate with that of Southern Arabia. One species of Aloe from Arabia, *A. inermis* Forsk, has been found in considerable numbers in the far eastern parts of the Protectorate near Las Anod, and beyond the Great Nogal Valley near Halin, and further north-eastwards near the Somalia border.

Another species—with very shaggy perianths—grows in considerable numbers near Moledera, which is about 40 miles southwards from Erigavo, and this species, it seems, belongs to *A. tomentosa* Deflers.

Thanks to Mr. J. Leandri, I have been able to study and photograph the type material of *A. tomentosa* which he sent out to me from the Herbarium of the Natural History Museum in Paris. A label on the sheet reads, "A. Deflers—Voyage dans l'Yemen 1887. No. 616. Bauân. Alt. 2700 m, 30 Juin 1887". The description was published in Deflers' "Voyage au Yemen", p. 211 (1887), the type locality being: Ad fauces montis Hadhur, prope Bauân. There are no figures.

The type material consists of the terminal 40 cm. of an inflorescence and includes the terminal raceme and a shorter branch-raceme. The terminal raceme is densely flowered, conical, 11 cm. long, 5.5 cm. diam., with the apical buds crowded and hidden by imbricate bracts. Perianths are remarkably tomentose, while the axis below the raceme is also tomentose.

Allowing for geographical variations, and for racemes varying from shorter and denser to longer and laxer, I now regard the Moledera plants as belonging to *A. tomentosa*.

Compared with the type, the Moledera form differs in having slightly longer less dense racemes, with the apical buds less crowded and less hidden by their bracts.

The leaves, however, pose a problem. There is no leaf or portion of a leaf included with the type of *A. tomentosa*. In his description, Deflers (*l.c.*) merely states "*foliis radicalibus, ensiformibus, carnosius, crassis, scapo brevioribus*"; he gives no measurements, and makes no mention of the leaf margins. Whether they are entire or dentate is not known.



PLATE XIII. *Aloe tomentosa* Deflers
 Photograph of the type, in Paris—Deflers 616, Bauân, Yemen, alt. 2,700 m.,
 30 June 1887.

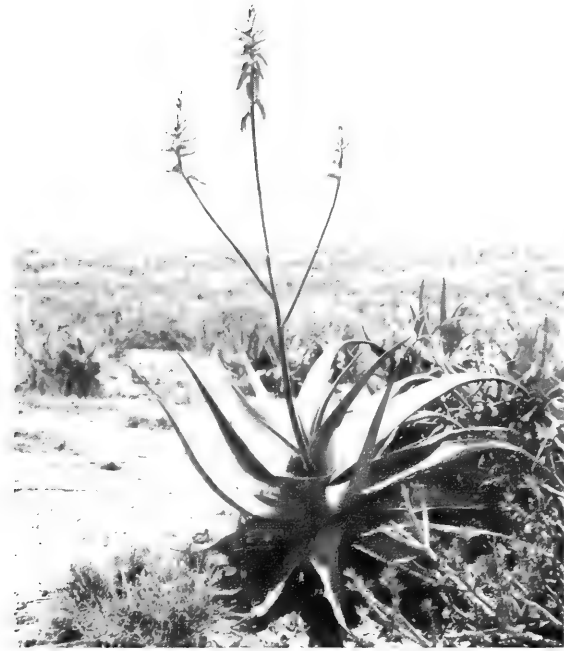


PLATE XIV. *Aloe tomentosa* Deflers
Upper: Somaliland Protectorate, near Moledera, 40 miles south of Erigavo, alt. 4,800 ft. Height 60 cm. *Lower:* Flowers 1 1 from bud to post-pollination stage.

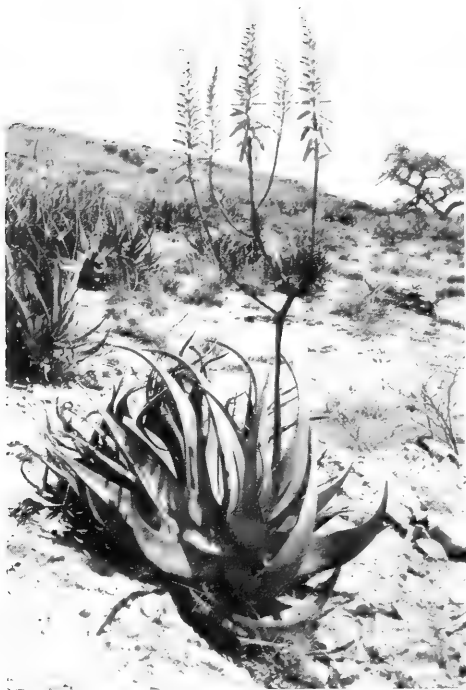


PLATE XV. *Aloe tomentosa* Deflers

Upper: A robust form near Moledera, 40 miles south of Erigavo. Height 75 cm.

Lower: Flowers 1/1 from bud to post-pollination stage.

Mr. Leandri states that there are no manuscripts or notebooks of Deflers in the Library of the Museum, hence, the leaves will remain unknown until the type locality in the Yemen can be re-visited. I had hoped to visit the Yemen from Aden, but hostilities along the border made this impossible.

Since the height and branching of the inflorescence of the Moledera plants, also the pedicels, bracts and very tomentose perianths agree with *A. tomentosa*, I conclude that the Moledera plants are conspecific with *A. tomentosa*.

A. tomentosa is nearest allied to *A. trichosantha* Berger (which I have seen in considerable numbers at the type locality, Ghinda, between Asmara and Massawa in Eritrea), but in the latter the leaf margins are markedly dentate, the racemes are much longer and laxer, and the perianths are less tomentose.

A. tomentosa usually has little or no stem, and sometimes forms large dense groups. The leaves average 9 cm. broad and 35 cm. long, while margins vary from entire to minutely dentate with teeth only .5—1 mm. long and 20—40 mm. apart.

The subjoined description is based on plants in considerable numbers at Moledera:

A. tomentosa Deflers in *Voyage au Yemen*, 211 (1899); Berger in *Pflanzenr. Liliac.-Alcin.* 232 (1908).

Plant succulent, with short decumbent stems and upturned rosettes, forming small to large dense groups.

Leaves 16—20, densely rosulate, lanceolate-deltoid, averaging 35 cm. long, 9 cm. broad at base, narrowing to an acute dentate apex, spreading, the lowest usually falcately up-curved; *upper surface* grey-green with reddish tinge, flat low down, slightly channelled upwards, unicoloured, not spotted; *lower surface* convex, greener than upper surface; *margins* with narrow pinkish brown cartilaginous border armed with blunt teeth .5—1 mm. long, 20—40 mm. apart, the teeth sometimes obsolete and margins entire; *sap* dries pale yellow.

Inflorescence branched, averaging 60—70 cm. tall.

Peduncle basally plano-convex and 14 mm. broad, terete upwards, averaging 3—4-branched from about the middle, the lowest branch subtended at base by an ovate-acute, thin scarious 5—7-nerved bract 10 mm. long, 8 mm. broad.

Racemes cylindric-conical, the terminal averaging 15 cm. long, 5—6 cm. diam., the lateral shorter, subdensely flowered, the apical buds erect,

adpressed to the axis, and sometimes hidden by densely imbricate bracts, open flowers nutant.

Bracts ovate-deltoid, 7 mm. long, 4 mm. broad, thin, scarious, dirty white, 5-nerved.

Pedicels averaging 6 mm. long, sometimes up to 9 mm. long.

Perianth cylindric-trigonus, rose-pink, conspicuously tomentose-shaggy; 24—28 mm. long, slightly rounded at base, 7—8 mm. diam. across the ovary, thence slightly narrowed on underside only, and trigonous to a wide open mouth; *outer segments* free for 9 mm. (tube 17 mm.), paler at margins, obscurely 3-nerved, the apices subacute, spreading; *inner segments* free but dorsally adnate to the outer for 16 mm., broader than the outer and with more obtuse more spreading apices.

Filaments lemon, the 3 inner narrower and lengthening before the 3 outer with their *anthers* in turn exerted 3—4 mm.

Stigma at length exerted 4—5 mm.

Ovary pale olive, 6 mm. long, 3 mm. diam.

Capsule 18 mm. long, 9—10 mm. diam. at the middle.

Habitat Yemen: Ad fauces montis Hadhur, prope Bauân, 2,700 m., 30 Juin 1887, Deflers 616! type (P).

SOMALILAND PROTECTORATE: Moledera, 40 miles south of Erigavo, c. 10° 09' N., 47° 13' E., alt. 4,700—4,900 ft., fl. 12 Sept. 1957, Reynolds 8445 (PRE, K, EA); Moledera, 7 Nov. 1954, Bally 10358 (EA).

ACKNOWLEDGMENTS

I am greatly indebted to His Excellency, Sir Theodore Pike, K.C.M.G., for the invitation to visit Somaliland Protectorate, and for providing transport, full camping equipment, and a very efficient Somali staff.

Mr. J. M. Watson, Director, Department of Natural Resources, for hospitality and much assistance in several directions.

Mr. P. R. O. Bally, botanist, Coryndon Museum, Nairobi, for many plants from Somaliland Protectorate, for photographs, data and field notes and for considerable assistance over many years.

The Director of Kew and Mr. E. Milne-Redhead for data, photographs of specimens at Kew and for other valuable help.

Mr. J. Leandri, Muséum National d'Histoire Naturelle, Paris, for sending the type material of *A. tomentosa* to me for examination, and for much other assistance.

Dr. R. A. Dyer, Chief, Division of Botany, Pretoria, for the facilities of the National Herbarium and for many photographs.

The South African Council for Scientific and Industrial Research for a travelling grant that enabled me to fly to Somaliland Protectorate to investigate the Aloes.

NOTES ON THE ALOES OF SOMALILAND PROTECTORATE

By G. W. REYNOLDS

With Descriptions of Eight New Species
By G. W. REYNOLDS and P. R. O. BALLY

(With Plates XVII—XXXII)

Before the turn of this century, several renowned botanical travellers had traversed parts of the country now known as Somaliland Protectorate.

Hildebrandt had made a short trip from Berbera westwards to Bulhar, and later, in 1875, he visited the Surud (Erigavo) and Al Madu areas in the far east. The outstanding travellers from the Aloe point of view were Ruspoli and Riva in 1894-95, but they contributed nothing from the Protectorate.

Aloe megalacantha Baker was described in *Fl. Trop. Afr.* 7 : 469 (1898) from material gathered by Riva on 2 January 1893, at Mil Mil in the Ogaden (Ethiopia), which is about 100 miles south of Hargeisa, the present capital of Somaliland Protectorate. This is surprising because the same species grows in considerable numbers for many miles around Hargeisa, but had repeatedly been mistaken for *A. abyssinica* Lam. (see below).

The first species of Aloe to be described (in 1899) from Somaliland Protectorate was *A. somaliensis* Watson, plants of which had been raised at Kew from seeds collected by Miss Edith Cole in 1895, probably near Upper Sheikh in the Golis Range south of Berbera.

In the territory now known as Somalia (Italian Mandate) the travellers contributing most to Aloe knowledge were Riva 1894, Stefanini and Paoli 1913, and Stefanini and Puccioni 1924.

In 1931, Mr. J. B. Gillett travelled in western Somaliland and in the Harar Province of Ethiopia. He published *The Plant Formations of Western British Somaliland and the Harar Province of Abyssinia* in *Kew Bull.* No. 2 (1941). This comprehensive ecological work includes a large list of the names of plants he had collected together with many vernacular names. Subsequently, in 1952, Mr. Gillett worked along the southern boundary of Ethiopia with the Kenya-Ethiopian Boundary Commission and during those travels he sent many Aloe plants to me, together with photographs and field notes, for which I am most grateful.

Mr. Gillett's list (*Kew Bull.*, p. 182) includes the following species of Aloe (with my own comments added):

- (1) *A. abyssinica* Lam. Hargeisa.—This was wrongly identified. The species growing in considerable numbers near Hargeisa is *A. megalacantha* Bak. *A. abyssinica* was described by Lamarek in 1783 from a plant brought back to Paris by Bruce, presumably from Eritrea or Northern Ethiopia. The identity of *A. abyssinica* is still unknown. The subject is discussed, and a photograph of the type material in Paris is reproduced in *Journ. S.A. Bot.* 22 : 151, Pl. 29 (1956).
- (2) *A. aethiopica* (Schweinf.) Berger.—This species does not occur in any part of Somaliland Protectorate, or in Southern Ethiopia. *A. elegans* Tod. (\equiv *A. aethiopica* (Schweinf.) Berger) grows abundantly in Northern Ethiopia and Eritrea.—See *Journ. S.A. Bot.* 22 : 153, Pl. 30–33 (1956).
- (3) *A. Rivae* Bak. Daar Burug.—The species growing near Darburruk, 54 miles north-east of Hargeisa on the road to Berbera was incorrectly identified. The Darburruk species is a shrub with erect stems 1—1.5 met. long; leaves 25 cm. long, 5—6 cm. broad; inflorescence a branched panicle 45 cm. tall; racemes 3 cm. long; pedicels 5—6 mm. long; perianth yellow, averaging 20 mm. long, all lying along the upper side of the axis and pointing backwards. This is one of the eight new species described below.

It is in all ways different from *A. Rivae*, which was described from material gathered by Riva on 7 November 1893 in north-west Borana, Southern Ethiopia.

Mr. Bally and I found large numbers of *A. Rivae* on lower slopes of Mega Mountain, and near Yavello, 66 miles to the north. *A. Rivae* is not of shrubby growth. Leaves are densely rosulate, up to 50 cm. long, 17 cm. broad; pedicels 12 mm. long; perianth scarlet, averaging 33 mm. long.—See *Journ. S.A. Bot.* 20 : 39, Pl. 6 (1954).

- (4) *A. somalienses* Watson (not C. H. Wright). Near Hargeisa.—This is correct. Mr. Gillett's material n. 3996 in Kew is conspecific with the species raised at Kew from seeds gathered by Miss Edith Cole in 1895, probably near Upper Sheikh in the Golis Range south of Berbera.
- (5) *A. Steudneri* Schweinf. Satoa tug, long. 43° 5' E., lat. 9° 59' N.—Judging from the latitude and longitude given by Mr. Gillett, the locality appears to be a few miles north-west of Borama in Western Somaliland.

A. Steudneri was described and figured in *Bot. Mag. t. 8448* (1912) from Mt. Sabr in Northern Eritrea. Neither Mr. Bally nor I have found any species near Borama or elsewhere in Somaliland, that resembles the *Bot. Mag.* figure.

- (6) *A. trichosantha* Berger. Hargeisa: *Daar merodi*.—I have not seen *A. trichosantha* near Hargeisa or elsewhere in the Protectorate. A species, related to *A. trichosantha* but differing in having larger rosettes, much larger leaves, and perianths minutely pubescent (not conspicuously albo-tomentose), was found by Mr. Bally, and also independently by myself, from the Borama district eastwards to the foot of Sheikh Pass and elsewhere. Possibly this was the species seen by Mr. Gillett. It is called *Daar merodi* by the Somalis, and also grows about 20 miles north of Hargeisa (with *A. somaliensis* and *A. megalacantha*). This is one of the eight new species described below.

It is also necessary to discuss the Aloes listed by Major P. E. Glover in his *A Provisional Check List of British and Italian Somaliland Trees, Shrubs and Herbs* (1947). The Aloes listed on p. 321 include those in the Protectorate, the "Reserved Area" now returned to Ethiopia, and Italian Somalia.

The following is Glover's list of Aloes, with my own comments:

- (1) *A. abyssinica* Lam.—See above.
- (2) *A. aethiopica* (Schweinf.) Berger.—See above.
- (3) *A. ambigens* Chiov.—This is a *species non satis cognita*. It was described from: Somalia Media, Sultanate of Obbia, between Attodi and Dolobscio, 26 April 1924. Puccioni et Stefanini n. 447 (499). Habit of growth and leaves unknown.—See *Journ. S.A. Bot.* 20 : 34 (1954).
- (4) *A. defalcata* Chiov. *Bahar*.—This "species" was described in *Fl. Somalia* 2 : 424 (1932) from Somalia, Oltregiuba near Uar Seek (Dr. R. Guidotti 1931 n. 64). This is a mixture of species and cannot be upheld. The leaves of *A. microdonta* were combined with the flowers of *A. Ruspoliana*.—See *Journ. S.A. Bot.* 20 : 34 (1954).
- (5) *A. megalacantha* Bak.—This is the species of shrubby growth found abundantly for many miles around Hargeisa, near Borama, and elsewhere. It also occurs in large numbers near Dire Dawa, Harar Prov. Ethiopia. Type locality is Mil Mil, about 100 miles south of Hargeisa, Ogaden, Ethiopia.
- (6) *A. microdonta* Chiov.—Widely distributed in Central and

- Southern Somalia. See *Journ. S.A. Bot.* 20 : 31, Pl. 5, Figs. 1-3 (1954). Does not occur in Somaliland Protectorate.
- (7) *A. otallensis* Baker.—Not known in Somaliland Protectorate. This species occurs in Borana, Southern Ethiopia, from near Agere Mariam to Yavello and Dubuluck to Mega. Also occurs near Moyale in the Northern Province of Kenya.
 - (8) *A. percrassa* Tod.—This species does not occur in Somaliland Protectorate. I have found it only at 8,000 ft. and higher in Northern Ethiopia and on the Kohaito Plateau, Eritrea. *A. percrassa* is characterised by having very large rosettes of leaves, a branched inflorescence, racemes cylindric-conic, pedicels 15—20 mm. long, and scarlet perianths averaging only 20 mm. long.
 - (9) *A. Pirottae* Berger.—This species, found mostly under thorn bushes, occurs in some numbers on the Burao-Las Anod road near Kirit. and between Kirit and Ainabo. The furthest north known (10° 07' N.) is 24 miles north of El Afwein, which is 41 miles south of Erigavo.
 - (10) *A. Rivaie* Bak. *Daar burug*, *Da-ar buruk*.—See above. (*A. somaliensis* Watson is not included in Glover's list.)

Between 1943 and 1957 Mr. P. R. O. Bally visited the Protectorate on six occasions. He paid particular attention to the Aloes and sent many Aloe plants to me, together with photographs and field notes, which proved invaluable when I visited the Protectorate in August and September 1957 investigating only the Aloes. During my travels I visited every part of the Protectorate that I could reach and travelled over 2,700 miles. I could not reach the Al Madu area in the far east, but Mr. Bally has investigated the Aloes there. Included in several Aloes found in the eastern Al Madu, was one species with almost biconvex leaves, not known elsewhere.

It now seems that the Aloes of Somaliland Protectorate have been as fully investigated as is possible.

From the combined travels and investigations of Mr. Bally and myself, it can now be stated that there is a minimum of nineteen distinct species of Aloe occurring in Somaliland Protectorate. Seven are named species and twelve are undescribed. The seven named species are:

- (1) *A. jucunda* Reynolds. Gaan Libah. A very small species growing in dense groups, leaves only 4 cm. long, 2.5 cm. broad, inflorescence simple, 30 cm. tall.—See *Journ. S.A. Bot.* 19 : 21, Pl. 11 (1953).
- (2) *A. Peckii* Bally et Verdoorn. A striking species with marbled olive-green leaves, a branched inflorescence and straw-coloured

- perianths with brownish stripes longitudinally. Abundant near Erigavo and in the Al Madu area.—See *Fl. Plants Afr.* 31: Pl. 1214 (1956).
- (3) *A. somaliensis* Watson. Sheikh Pass, Upper Sheikh, north of Hargeisa, Borama. A stemless species with glossy spotted leaves, branched inflorescence, and scarlet cylindric-trigonus perianths averaging 28—30 mm. long.
- (4) *A. inermis* Forsk. Las Anod, Taleh, Halin. Stemless, forms dense groups, leaves 25 cm. long, 6 cm. broad, entire, inflorescence branched, pedicels 5 mm. long, perianth dull scarlet, cylindric-trigonus 22 mm. long. Originally described from Arabia.
- (5) *A. Pirottae* Berger. Ainabo; Kirit; 40 miles south of Erigavo. Grows mostly under thorn bushes. Stemless, forms groups. Leaves dark brownish green, 35 cm. long, 7 cm. broad, margins dentate and somewhat involute; inflorescence branched, 1 met., racemes subclaxly flowered and 12—15 cm. long, pedicels 5 mm. long, perianth scarlet, cylindric-trigonus, 30 mm. long.
- (6) *A. tomentosa* Defflers. Abundant at Moledera, 40 miles south of Erigavo. Forms dense groups. Leaves entire or margins minutely dentate, inflorescence 3—4-branched, perianths remarkably tomentose, averaging 26 mm. long. Originally described from Arabia.
- (7) *A. megalacantha* Bak. (= *A. magnidentata* Christian). Abundant near Hargeisa, Borama, etc. A shrub with stems up to 75 cm. tall, leaves deeply channelled and recurved, inflorescence a many-branched panicle, perianth red to orange and yellow, cylindric-trigonus, 26—30 mm. long. Type locality is Mil Mil, 100 miles south of Hargeisa.

Of the twelve undescribed species, four are awaiting flowers, and are being cultivated in Johannesburg.

The four species are:

- (1) A small sub-shrubby species on precipice faces one mile north of Daloh, about 12 miles north of Erigavo. This species is much branched at base, with stems 10—20 cm. long, leaves averaging 10 cm. long, 2 cm. broad, inflorescence simple and about 30 cm. long. Flowers not yet seen.
- (2) A species in Sect. *Saponariae*, allied to *A. lateritia* Engler, found near the top of Sheikh Pass and elsewhere.
- (3) A species with very thick, almost bi-convex leaves found by Mr. Bally in the far eastern Al Madu near Baditur (Bally 10929).

- (4) A species in considerable numbers on both sides of Helidera Tug, in the far-eastern parts of the Protectorate, about 17 miles north-east of Halin, and near the Somalia border. This species has a stem of up to 1 met., leaves up to 60 cm. long, 12 cm. broad, and a many-branched inflorescence 1 met. and more high with the branches horizontally disposed. Flowers not seen.

The remaining eight species can now be described and figured, and because of the considerable and invaluable assistance that I have received from Mr. Bally, over many years, his name is joined as co-author.

A. scobinifolia Reynolds et Bally. Species nova, affinis *A. elegans* Tod. (Eritrea), foliis brevioribus marginibus integris, racemis brevioribus, floribus brevioribus cylindrico-clavatis differt.

Planta succulenta, acaulis vel breviter caulescens. *Folia* 16—20, dense rosulata, arcuato-adscendens, anguste lanceolato-attenuata, 30 cm. longa, 7 cm. lata, 12—15 mm. crassa; *supra* planiuscula vel leviter canaliculata; *subtus* convexa, utrinque viridula, aspera, marginibus integris. *Inflorescentia* paniculata, 5—8-ramosa, 60—70 cm. alta. *Racemi* dense corymboso-capitati, 3—4 cm. longi, 6 cm. diametro. *Bractee* anguste deltoideae, 8 mm. longae, 2 mm. latae, scariosae, albiae, 3—5-nervatae. *Pedicelli* 15—18 mm. longi. *Perianthium* luteum, aurantiacum vel coccineum, cylindrico-clavatum, 22 mm. longum; *segmenta exteriora* per 9—10 mm. libera, obscure 3-nervata. *Antherae* 3—4 mm. exsertae. *Stigma* demum 5 mm. exserta. *Ovarium* viridula, 6 mm. longum, 2.5 mm. diametro. (Plates XVII, XVIII.)

HABITAT: Somaliland Protectorate: In considerable numbers near Erigavo, c. 10° 37' N., 47° 22' E., alt. 5,500 ft., fl. 8 Sept. 1957, Reynolds 8403 (red flowers) holotype (PRE), isotype (K, EA); same locality, yellow flowers, Reynolds 8402 (PRE, K, EA); Agasur, eastern Al Madu, 10 Oct. 1956, Bally 11019 (EA).

A. scobinifolia occurs in vast numbers near Erigavo, for 30 miles along the road southwards towards El Afwein, and along the road north-eastwards to Medishe. Mr. Bally has found this species in considerable quantities much further east on the Al Madu, and at Agasur where a form occurs with horny leaf margins with minute widely-spaced teeth.

The typical form is characterised by having leaves that are rough to the touch, like shark skin, and margins with a very narrow pinkish smooth edge without teeth.

Flower colours vary from yellow to orange and scarlet and provide a magnificent blaze of colour when flowering in their hundreds of thousands all around Erigavo.

REVISED DESCRIPTION OF OXYMITRA CRISTATA

by

S. GARSIDE

(to be inserted on p. 83, *Jnl. S. Af. Botany*, Vol. XXIV, Part II, April 1958)

Oxymitra cristata, sp. nov.

Monoica. Frondes caespitosae confertae, intense virides, integrae vel furcatae, apice rotundatae; squamae ventrales biseriatae, atro-violaceae vel basin versus gradatim hyalinae, oblique triangulares, magnae denseque imbricatae, apice longe cuspidatae, marginem frondis bene superantes, in apicem frondis hamatim incurvae.

Stomata simplicia 5—4—6 cellulis, parietibus radiantibus parum incrassatis, cincta.

Antheridia in pulvillos medianos lineares disposita, ostiolis longe eminentibus, basi minute bracteatis atque cum aetate purpurascentibus.

Archegonia ante antheridia posita, in seriem unicam linearem disposita atque in involucri connata immersa, cristam medianam prominentem crenatam formantia. Bractae desunt.

Sporae angulares nigrescentes, 100—115 μ in maximo diametro; exterior facies irregulariter reticulata, interiores facies laeves; ala angusta, usque ad 5 μ lata, margine integra vel crenata.

Type in Herb. Bolus, Schelpe 5900. Duthie 5531.



PLATE XVII. *Aloe scobinifolia* Reynolds et Bally
Flowering in considerable numbers near Erigavo; September 1957. Height 60–70 cm.



PLATE XVIII. *Aloe scobinifolia* Reynolds et Bally
Upper row: Flowers 1, 1 from bud to post-pollination stage. *Lower row:* Flowers 1, 1,
gathered at random, showing variation.

This charming species prefers exposed stony gypsum soils, and is found mostly between 5,000 ft. and 5,500 ft. Flowering period is from September to November.

The Somalis refer to it only as *Daar*.

A. scobinifolia is nearest allied to *A. elegans* Tod. (= *A. aethiopica* (Schweinf.) Berger) which grows in Tigre, Northern Ethiopia, and is especially abundant in many parts of Eritrea. *A. elegans* differs in being a much larger plant, with larger smooth leaves, prominent marginal teeth, and longer less clavate flowers.—See *Journ. S.A. Bot.* 22 : 153, Pl. 30—33 (1956) for description and figures of *A. elegans* Tod.

DESCRIPTION: *Plant* sometimes solitary, usually forming small groups.

Stem none or short.

Leaves 16—20, densely rosulate, arcuate-ascending, narrowly lanceolate-attenuate, averaging 30 cm. long, 7 cm. broad at base, 12—15 mm. thick, narrowing to an acute spiny point; *upper surface* flat to slightly canaliculate; *lower surface* convex; *both surfaces* unicoloured dull green, rough to the touch; *margins* with very narrow pale pink cartilaginous edge, without teeth; *sap* dries deep brown.

Inflorescence a branched panicle averaging 60—70 cm. high, 2—4 simultaneously.

Peduncle basally plano-convex and 15—20 mm. broad, terete upwards, brown with a bloom, minutely white-speckled, averaging 5—8-branched, the lowest branch sometimes with a short branch high up.

Racemes corymbose-capitate, densely flowered, 3—4 cm. long, 6 cm. diam., youngest buds obliquely to horizontally spreading, open flowers nutant to pendulous.

Bracts narrowly deltoid, deflexed, 8 mm. long, 2 mm. broad, thin, scarious, white, 3—5-nerved.

Pedicels suberectly spreading, 15—18 mm. long, the bud pedicels almost as long as those of open flowers.

Perianth yellow, orange or scarlet, cylindric-clavate, trigonous, averaging 22 mm. long, basally obtuse and shortly stipitate, 4—5 mm. diam. across the ovary, thence trigonous-clavate, the mouth wide open; *outer segments* free for 9—10 mm., obscurely 3-nerved, the apices sub-acute, slightly spreading; *inner segments* broader than the outer and with more obtuse more spreading apices.

Filaments lemon, filiform-flattened, the three inner narrower and lengthening before the 3 outer with their *anthers* in turn exserted 3—4 mm.

Stigma at length exserted 5 mm. *Ovary* pale green, 6 mm. long 2.5 mm. diam.

A. breviscapa Reynolds et Bally. Species nova, affinis *A. tomentosae* Deflers (Arabia), inflorescentia breviora ramosiore foliis vix superans, floribus longioribus glabris differt.

Planta acaulis vel caulibus decumbentis .5—1 met. longis. *Folia* c. 24, dense rosulata, lanceolato-attenuata, 30—35 cm. longa, 8—10 cm. lata; *supra* basi planiuscula, superne leviter canaliculata; *subtus* convexa; marginibus integris vel basi dentibus .1—2 mm. longis, 10 mm. distantibus superne integris. *Inflorescentia* paniculata, arcuato-adscendens, c. 50 cm. longa. *Racemi* erecti, cylindrici, laxi, 20—25 cm. longi, 6 cm. diametro. *Bractae* ovato-acutae, 6 mm. longae, 3 mm. latae, scariosae, albidae, 1—3-nervatae. *Pedicelli* 10—14 mm. longi. *Perianthium* coccineum, cylindrico-trigonum, 26—30 mm. longum, circa ovarium 8 mm. diametro; *segmenta exteriora* per 10 mm. libera, 3-nervata; *antherae* 2—3 mm. exsertae; *stigma* demum 4 mm. exserta. *Ovarium* viridulum, 6 mm. longum, 3 mm. diametro. (Plate XIX.)

HABITAT: Somaliland Protectorate: 40 miles east of Erigavo, 4,700 ft., 20 Oct. 1956, Bally B 11188 (EA); 48 miles east of Erigavo on road to Hadaftino, 4,600 ft., c. 10° 45' N., 48° 03' E., 14 Sept. 1957, Reynolds 8452, holotype (PRE), isotype (K, EA).

A. breviscapa occurs in considerable numbers on stony gypsum plains on the road eastwards from Erigavo to Hadaftino from mile 40 to mile 54 near Hadaftino at about 4,600 ft., alt., thence eastwards towards Baran for 20 miles and occasionally on the Shemis Plain to near Huberra. It occurs occasionally in broken country for about 40 miles south-eastwards from Huberra to near Buran near the Somalia border.

Plants near Buran were not flowering when I was there, but they appear to be weaker forms of the species.

A. breviscapa is characterised by forming small to large dense groups, and by having leaves that vary from entire to partly dentate. When marginal teeth are present they occur only on the lowest third of leaf margins, the teeth being obtuse, 1—2 mm. long and 10 mm. apart, obsolescent upwards. The rosettes almost lie on their sides, and the terminal raceme of the arcuate-ascending inflorescence is usually only slightly higher than the tips of the uppermost leaves. The perianths are smooth.

In habit of growth, and in leaf characters, *A. breviscapa* bears a striking resemblance to *A. tomentosa* Deflers which occurs in vast numbers near Moledera, 40 miles south of Erigavo on the road to El Afwein, but the latter has a much taller less branched erect inflorescence, denser racemes, larger bracts, and shorter remarkably shaggy-tomentose perianths.

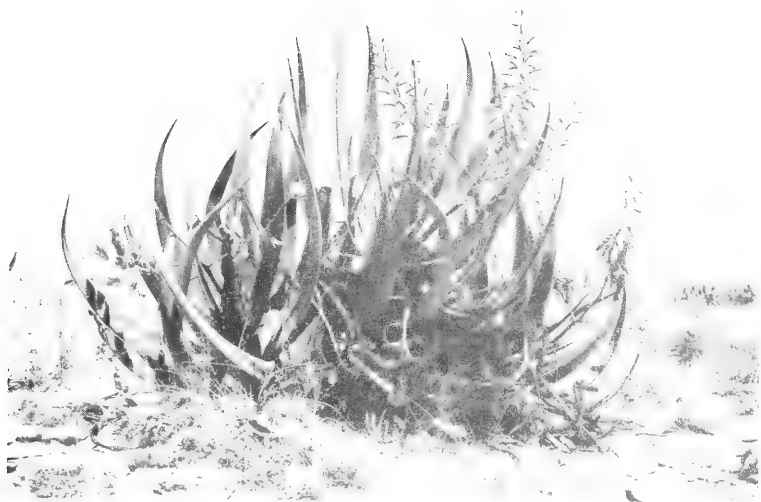


PLATE XIX. *Aloe breviscapa* Reynolds et Bally
 Plant on gypsum plains 48 miles east of Erigavo on road to Hadaffimo. Height 50 cm.
 Flowers 1/1 from bud to post-pollination stage.

DESCRIPTION: *Plants* forming small to large dense groups.

Stem short or 50 cm. long, decumbent, sometimes up to 1 met. in old specimens, with old dried leaf remains persistent, the rosettes usually decumbent.

Leaves about 24, densely rosulate, lanceolate-attenuate, averaging 30—35 cm. long, 8—10 cm. broad at base, narrowing to an acute apex; *upper surface* unicoloured bluish grey with reddish tinge, without spots or markings, flat low down, slightly canaliculate upwards; *lower surface* rounded; *margins* usually entire, sometimes with a few very short blunt teeth 1—2 mm. long, 10 mm. apart in basal quarter only, thence entire upwards; *sap* dries yellow.

Inflorescence a branched arcuate-ascending panicle about 50 cm. tall, the terminal raceme usually only slightly higher than the tips of the leaves.

Peduncle brown with a bloom, plano-convex and 12 mm. broad at base, terete upwards, divaricately 4—8-branched from low down.

Racemes ascending, rather laxly-flowered, cylindric, 20—25 cm. long 6 cm. diam., youngest buds obliquely spreading, open flowers nutant.

Bracts ovate-acute, 6 mm. long, 3 mm. broad, thin, scarious, white, 1—3-nerved.

Pedicels 10—14 mm. long, obliquely spreading with apex nutant.

Perianth glabrous, cylindric-trigonous, 26—30 mm. long, scarlet with a bloom, greenish at mouth, 8 mm. diam. across the ovary, thence slightly narrowed on underside and slightly decurved, the mouth wide open; *outer segments* free for 10 mm., thinner at margins, 3-nerved the nerves turning greenish at apex, the apices subacute slightly spreading; *inner segments* broader than the outer, with broad white marginal border, prominently keeled, the apices more obtuse and more spreading than the outer.

Filaments lemon, the 3 inner narrower and lengthening before the 3 outer with their *anthers* in turn exerted 2—3 mm. *Stigma* at length exerted 3—4 mm. *Ovary* pale green, 6 mm. long, 3 mm. diam.

A. rigens Reynolds et Bally. Species nova, affinis *A. trichosanthae* Berger, foliis majoribus, perianthio brevissime pubescente differt.

Planta acaulis vel breviter caulescens. *Folia* c. 24, dense rosulata, arcuato-adscendens vel suberecto-patentia, rigidissima, 60—80 cm. longa, 12—15 cm. lata, sensim attenuata, 15—25 mm. crassa; supra viridula, leviter canaliculata, subtus convexa, marginibus dentibus deltoideis 4—6 mm. longis, 20—35 mm. distantibus armata. *Inflorescentia* saepe 3-ramosa, 1.25—1.75 met. alta. *Racemi* cylindrico-acuminati, 20—30 cm. longi, 6 cm. diametro. *Bractae* usque ad 15 mm. longae, 6 mm.

latae, albae, 7—9-nervatae. *Pedicelli* 5—6 mm. longi. *Perianthium* pallide coccineum cylindrico-trigonum, brevissime pubescens 30—34 mm. longum; *segmenta exteriora* per 10—12 mm. libera, obscure 3-nervata, interiora latiora. *Antherae* 2—3 mm. exsertae. *Stigma* demum 4 mm. exserta. *Ovarium* 6 mm. longum, 3 mm. diametro. (Plates XX, XXI.)

HABITAT: Somaliland Protectorate: Foot of Sheikh Pass, cult. Nairobi, fl. 1943, Bally B. 9661 (EA); 4 miles north-east of Darburruk, 15 Jan. 1954, Bally B. 10383 (EA); Ged Dehti, 20 miles north of Hargeisa, 27 Sept. 1957, Bally B. 11767 (EA); 4 miles north-west of Bawn on Zeila road, 23 Oct. 1957, Bally B. 11920 (EA); 5 miles N.W. of Bawn, 36 miles N.W. of Borama, 3,900 ft., c. $10^{\circ} 13' N.$, $43^{\circ} 03' E.$, 31 Aug. 1957, Reynolds 8369 holotype (PRE), isotype (K. EA).

Mr. Bally collected plants (without flowers) and seeds of this species in 1943 and 1949, about 4 miles beyond Darburruk on the Hargeisa-Berbera road, at 3,400 ft. In 1954 and in 1956 he found plants in flower.

On 31 August 1957 I found large numbers of plants, many in flower, 5 miles north-west of Bawn, 36 miles beyond Borama, and 112 miles westwards from Hargeisa on the road to Zeila, at 3,900 ft. altitude. This species continues for about 20 miles along the Zeila road down to 2,750 ft.

A. rigens, and the var. *glabrescens*, is the most widespread species in the Protectorate and extends from the Bawn area eastwards to Ged Dehti 20 miles north of Hargeisa, eastwards to near Darburruk (55 miles from Hargeisa), also south of Berbera between Bihendula and Hudiso (at 2,300 ft.), near the foot of Sheikh Pass and for a few miles up the pass to 3,900 ft.

On the flats of Gaan Libah, 9 miles north-west of Ghor, a very robust form was seen at 5,100 ft. A cross with *A. megalacantha* was also noticed there.

The western typical form of *A. rigens* is characterized by having very large rosettes of rather bright green, very rigid leaves up to 80 cm. long and 12—15 cm. broad, an inflorescence of up to 1.75 met. high, short 5—6 mm. pedicels, and perianths that are very shortly puberulent.

A. rigens seems to be nearest allied to *A. trichosantha* Berger, which I have seen in large numbers at Ginda (type locality) between Asmara and Massawa in Eritrea. *A. trichosantha* is, however, a smaller plant with shorter leaves, and has perianths that are conspicuously albomentose.

DESCRIPTION: *Plant* succulent, acaulous or with short stem, mostly solitary, sometimes in small groups.



PLATE XX. *Aloe regens* Reynolds et Bally
Plant 5 miles north-west of Bawn, 36 miles north-west of Borama. Height 1.70 met.



PLATE XXI. *Aloe rigens* Reynolds et Bally
Flowers 1-4, from a plant 5 miles north-west of Bawn, 36 miles north-west of Borama.
Flowering Aug. Sept. 1957.



PLATE XXII. *Aloe rigens* Reynolds et Bally, var. *glabrescens* Reynolds et Bally
Plants on the Baurah Plain 16 miles north of Adad Kularle, 28 miles south of El
Afwein, on road to Erigavo. Height 1 met.



PLATE XXIII. *Aloe rigens* Reynolds et Bally var. *glabrescens* Reynolds et Bally
Flowers 1 1 from bud to fruit stage, from a plant on the Baaroh Plain, 28 miles
south of El Afwein, on road to Erigavo.

Leaves about 24, densely rosulate, varying from arcuate-ascending to suberectly spreading, very rigid, 60—80 cm. long, 12—15 cm. broad at base, gradually narrowing to the apex, 15—25 mm. thick at base; *upper surface* unicoloured pale to darker grey-green, sometimes with reddish tinge, slightly canaliculate; *lower surface* convex, similar in colour; *margins* armed with isolated pungent deltoid teeth that are 4—6 mm. long, 20—35 mm. apart, paler at base, reddish brown in upper half; *sap* dries yellow to orange.

Inflorescence branched, 1.25—1.75 met. high.

Peduncle basally plano-convex and 3 cm. broad, terete upwards, brown with a bloom, 3—4-branched from the middle or lower.

Racemes narrowly cylindric-acuminate, 20—30 cm. long, 6 cm. diam., youngest buds sometimes covered by densely imbricate bracts, older buds spreading horizontally, open flowers nutant to subpendulous.

Bracts up to 15 mm. long, 6 mm. broad, thin, scarious, white, rather brittle, 7—9-nerved.

Pedicels 5—6 mm. long, minutely puberulent.

Perianth rose-pink to dull scarlet, very shortly puberulent, cylindric-trigonus, 30—34 mm. long, basally obtuse, 7 mm. diam. across the ovary, very slightly curved, the mouth open; *outer segments* free for 10—12 mm., obscurely 3-nerved, the nerves greenish at apex, the apices subacute, slightly spreading; *inner segments* broader than the outer, and with more obtuse, more spreading apices.

Filaments pale lemon, the 3 inner narrower and lengthening before the 3 outer with their *anthers* in turn exerted 2—3 mm.

Stigma at length exerted 4 mm. *Ovary* pale olive, 6 mm. long, 3 mm. diam.

Somali name: *Daar merodi* (elephant aloe).

A. rigens Reynolds et Bally var. **glabrescens** Reynolds et Bally. Var. nov., a typico foliis brevioribus, inflorescente brevior, perianthio glabro differt. (Plates XXII, XXIII.)

HABITAT: Somaliland Protectorate: On the Baaroh Plains, 16 miles north of Adad Kularle (28 miles south of El Afwein) on the road to Erigavo, 2,700 ft., c. 9° 27' N., 46° 55' E., a few in flower on 6 Sept. 1957, Reynolds 8390 holotype (PRE), isotype (K, EA).

The eastern form is well worth varietal rank and differs from the typical in having thinner, shorter, more triangular greyish brown leaves that are more spreading to recurved and only 50 cm. long. The inflorescence is 3—4-branched from below the middle and only 75—100 cm. tall, with the apical buds of racemes usually not hidden by densely imbricate bracts. The perianth is usually glabrous although sometimes

under a lens it is minutely pubescent. The variety occurs along the Burao-Erigavo road where it is first seen at Adad Kularle. Mr. Bally photographed a flowering plant there in November 1954. It occurs in considerable numbers on the Baaror Plain, 16 miles north of Adad Kularle (c. $9^{\circ} 27' N.$, $46^{\circ} 55' E.$), and for 28 miles northwards to El Afwein. The northern limit is Kal Sheikh, a few miles north of El Afwein. North of Kal Sheikh a totally different species, *A. tomentosa* Deflers, comes in, and the two do not appear to overlap.

Numbers occur to the east of Burao, near Kirit, and between Kirit and Ainabo on the road to Las Anod. The weakest form seen was on low gypsum hills a few miles south of Las Anod.

DESCRIPTION: *Plants* in small to large groups. *Stem* none, short, or sometimes decumbent and up to 50 cm. long.

Leaves 18—24, densely rosulate, ascending-spreading to recurved, 40—50 cm. long, 10—12 cm. broad; *upper surface* uniformly grey-green with reddish tinge, slightly canaliculate; *lower surface* convex; *margins* armed with reddish brown pungent deltoid teeth that are 3 mm. long, 10 mm. apart low down, 15—20 mm. apart upwards.

Inflorescence 3—4-branched, 75—100 cm. high.

Racemes cylindric-acuminate, 25 cm. long, 5—6 cm. diam., youngest buds usually not hidden by imbricate bracts.

Bracts broadly ovate-acute, 9 mm. long, 4 mm. broad, thin, scarious, dirty white, 7—9-nerved.

Pedicels 5 mm. long.

Perianth strawberry-pink, paler to greenish at mouth, cylindric-trigonus, 32 mm. long, glabrous or minutely pubescent under a lens; *outer segments* free for 9 mm.

Anthers in turn exerted 3—4 mm. *Stigma* at length exerted 5 mm.

Ovary 7 mm. long, 3 mm. diam.

A. Gloveri Reynolds et Bally. Species nova, affinis *A. megalacanthae* Bak., caulibus gracilioribus suberectis patentibus vel procumbentibus, racemis laxioribus, floribus brevioribus differt.

Planta frutescens, caulibus suberectis, patentibus vel procumbentibus, saepe 50—100 cm. longis.

Folia lanceolato-attenuata, 20—30 cm. longa, 4—6 cm. lata, patula vel leviter recurva; supra viridula, basi planiuscula, superne leviter canaliculata; subtus convexa, marginibus dentibus 2—3 mm. longis, 8—10 mm. distantibus armata. *Inflorescentia* 8—12-ramosa, paniculata, c. 50 cm. longa, ramis divaricatis virgatis. *Racemi* laxi, cylindrici, 10—18 cm. longi, 5 cm. diametro. *Bractee* ovato-acutae, 3 mm. longae,



PLATE XXIV. *Aloe Gloveri* Reynolds et Bally
 Plants on Gaan Libah, 12 miles north-west of Ghor. Height 50 cm. Flowers yellow.
 1/1, from bud to post-pollination stage.

2 mm. latae, albidae, scariosae, 1-nervatae. *Pedicelli* 10—15 mm. longi. *Perianthium* luteum, aurantiacum vel coccineum, cylindrico-trigonum, 26—30 mm. longum; *segmenta exteriora* per 12 mm. libera, obscure 3-nervata. *Antherae* 3 mm. exsertae. *Stigma* demum 4 mm. exserta. *Ovarium* viridulum, 6 mm. longum, 3 mm. diametro. (Plate XXIV.)

HABITAT: Somaliland Protectorate: Sheikh Pass, 4,000—5,000 ft., 12 Feb. 1954, flowers bright red, Bally B. 9659 (EA); Gaan Libah, 12 miles N.W. of Ghor, c. $9^{\circ} 53' N.$, $44^{\circ} 47' E.$, alt. 5,300 ft., 29 Aug. 1957, yellow flowers, Reynolds 8358 holotype (PRE), isotype (K, EA); same locality, red flowers, Reynolds 8359 (PRE); north slopes of Sheikh Pass, c. $9^{\circ} 53' N.$, $45^{\circ} 12' E.$, alt. 3,700—4,600 ft., 28 Aug. 1957, Reynolds 8346 (PRE); 17 miles north of Erigavo on road to Mait in dry bush country, c. $10^{\circ} 50' N.$, $47^{\circ} 13' E.$, 3,600 ft., 8 Sept. 1957, Reynolds 8426 (PRE, K, EA).

Our new species is named after Major P. E. Glover who originally discovered it on Gaan Libah in 1944. Major Glover has contributed much to the knowledge of the flora of the Protectorate; his *Provisional Check List of British and Italian Somaliland Trees, Shrubs and Herbs* was published in 1947.

A. Gloveri is a plant of shrubby growth with stems that are branched at base, and are oblique, procumbent, or rambling over rocks. It occurs on Gaan Libah at 5,200 ft. altitude in an area receiving 25—30 inches of rainfall annually, near the edge of the scarp, yellow-flowered plants being more plentiful than red. At this locality, several crosses with *A. megalacantha* Bak. were seen.

It grows abundantly on northern slopes near the top of Sheikh Pass, while Mr. Bally has found it on Wagar Mountain to the east and on the Fodjor escarpment west of Sheikh Pass.

Much further east in the Erigavo district, forms of *A. Gloveri* occur from the northern end of the Tabah Pass at 6,000 ft., and 7 miles further down the spectacular escarpment road. It occurs in large numbers at mile 17 from Erigavo, at 3,600 ft., in dry bush country.

The species is variable in size of leaves, and flower colours vary from yellow and orange to scarlet. In very robust forms 4 inflorescences may be produced simultaneously, 1—2 being the average.

A. Gloveri is the only species known to me in Somaliland Protectorate with a sprawling habit of growth. It is allied to *A. megalacantha* Bak. but the latter is a much larger plant with erect stems, much larger deeply channelled recurved leaves, and different flowers. The main flowering time, it seems, is December—January.

DESCRIPTION: *Plant* of shrubby growth, branched at base, with stems divergent, lying along the ground, or rambling over rocks.

Stems 3—4 cm. diam., usually 50 cm.—1 met. long, the apical 30—50 cm. subdensely foliate.

Leaves lanceolate-attenuate, 20—30 cm. long, 4—6 cm. broad at base, spreading to slightly recurved; *upper surface* dull green, with or without a few white lenticular spots, flat low down, slightly canaliculate upwards; *lower surface* convex, similar to upper surface; *margins* armed with isolated pungent deltoid reddish brown teeth that are 2—3 mm. long, 8—10 mm. apart, the interspaces the colour of the leaf, the teeth usually more crowded low down, more spaced upwards; *sap* dries orange-brown.

Inflorescence a branched panicle about 50 cm. long, usually produced obliquely, sometimes 2—4 simultaneously in very robust growth forms.

Peduncle plano-convex and 12 mm. broad at base, branched at the middle or lower, with 8—12 divaricate virgate branches, the lowest 1—2 branches sometimes with 2—4 branchlets.

Racemes cylindric slightly conical, the terminal 10—18 cm. long, 5 cm. diam., rather laxly flowered, the flowers evenly distributed in erect racemes, somewhat subsecund in oblique racemes, lateral racemes slightly shorter than the terminal.

Bracts very small, ovate-acute, averaging 3 mm. long, 2 mm. broad, white, thin, scarious, 1-nerved.

Pedicels 10—15 mm. long.

Perianth yellow, orange, or dull scarlet with a bloom, cylindric-trigonus, 26—30 mm. long, basally obtuse, 8 mm. diam. across the ovary, thence trigonus and narrowing slightly to the mouth; *outer segments* free for 12 mm., obscurely 3-nerved, the apices subacute slightly spreading; *inner segments* free but dorsally adnate to the outer to the middle, broader than the outer and with broader more obtuse apices.

Filaments lemon, the 3 inner narrower and lengthening before the 3 outer with their *anthers* in turn exerted 3 mm.

Stigma at length exerted 4 mm.

Ovary pale green, 6 mm. long, 3 mm. diam..

A. retrospiciens Reynolds et Bally. Species nova, affinis *A. gracilicaulis* Reynolds et Bally, foliis brevioribus, dentibus brevioribus 1 mm. longis albidis, racemis capitatis, floribus subsecundis retrospicientis differt.

Planta fruticosa, caulibus basi 2—6-ramosis. 1—1.25 met. longis, 3 cm. crassis. *Folia* c. 12, patula recurvula, 25 cm. longa, 5—6 cm. lata, sensim attenuata; *supra* glauca, planiuscula, superne leviter canaliculata; *subtus* convexa: marginibus dentibus cartilagineis albidis 1 mm. longis, 5 mm. distantibus armata. *Inflorescentia* divaricato-ramosa, 45 cm.



PLATE XXV. *Aloe retrospiciens* Reynolds et Bally
Plants on north side of Darburruk Tug, 55 miles north-east of Hargeisa on road
to Berbera. Height 2 met.



PLATE XXVI. *Aloe retrospiciens* Reynolds et Bally
Flowers 1/1, from bud to post-pollination stage, from a plant on north side of
Darburruk Tug.

longa, c. 10-ramosa subhorizontaliter patula. *Racemi* subdensi, c. 3 cm. longi, 5 cm. diametro, floribus subsecundis, retrospicientis. *Pedicelli* 5—6 mm. longi. *Bractae* anguste ovato-deltaeidae, scariosae, albiae, 5 mm. longae, 2.5 mm. latae, obscurae 3-nervatae. *Perianthium* luteum, cylindrico-trigonum, 20 mm. longum, circa ovarium 6 mm. diametro; *segmenta exteriora* per 10 mm. libera (tubus 10 mm.), obscurae 3-nervatae; interiora latiora. *Antherae* 3 mm. exsertae. *Stigma* demum 4 mm. exserta. *Ovarium* viridulum, 3 mm. longum, 2 mm. diametro. (Plates XXV, XXVI.)

HABITAT: Somaliland Protectorate: At Darburruk, 55 miles north-east of Hargeisa on Berbera road, c. 9° 52' N., 44° 30' E., alt. 2,700 ft., 21 Sept. 1957, Reynolds 8482 holotype (PRE), isotype (K, EA).

Our very distinctive new species grows on both sides of Darburruk Tug (watercourse) near Darburruk village, about 55 miles north-east of Hargeisa on the road to Berbera, mostly among boulders in sandy soil, and under very arid conditions. The village is named after this Aloe, which the Somalis call *Daar buruk*.

A. retrospiciens sometimes has a simple stem, but plants are usually 2—6-branched (and more) at ground level. The leaves are bluish grey with a bloom and have a reddish tinge. The inflorescence is divaricately branched, the slender branches being obliquely to horizontally disposed. The terminal raceme is erect with the flowers evenly distributed around the axis, but in horizontal racemes the flowers are more or less secund, lying along the upper side of the axis, with all buds and flowers pointing backwards. It was this character that suggested the specific epithet.

The 20 mm. cylindric-trigonous flowers are closely allied to those of *A. gracilicaulis* and *A. medishiana*, both of which occur much further east in the Erigavo District, but the three could scarcely be confused. *A. gracilicaulis* has much longer deeply channelled leaves, while *A. medishiana* has longer pedicels and outer segments free for only 6 mm. Neither has flowers secund and pointing backwards.

Mr. Bally has found plants—not flowering at the time—near Elan Gubato (near Hudiso at the foot of Sheikh Pass), which appear to belong to *A. retrospiciens*.

DESCRIPTION: *Plant* of shrubby growth, with stem sometimes simple, but mostly 2—6-branched at base and forming compact shrubs. *Stem* 1—1.25 met. high, about 3 cm. thick.

Leaves c. 12, crowded at apex of stem, rosulate, spreading to recurved, averaging 25 cm. long, 5—6 cm. broad at base, gradually narrowing to an obtuse apex, the apex with a few very small cartilaginous firm

white teeth; *upper surface* bluish grey with reddish tinge, flat low down, slightly canaliculate upwards, usually unicoloured but occasionally with a few scattered small white spots low down; *lower surface* convex, otherwise as upper surface; *margins* with a continuous white cartilaginous edge armed with firm white teeth that are 1 mm. long and 5 mm. apart, low down, and gradually smaller and more distant upwards, sometimes obsolete near apex.

Inflorescence a divaricately branched panicle averaging 45 cm. long.

Peduncle plano-convex and 12—15 mm. broad at base, terete upwards, about 10-branched from the middle or lower, the lowest branches obliquely to almost horizontally disposed and up to 20 cm. long, including the raceme.

Racemes subdensely flowered, the terminal usually erect and about 3 cm. long, 5 cm. diam., with the flowers evenly distributed around the axis, in racemes of oblique to horizontal branches the buds and flowers mostly secund, lying along the top of the axis and all pointing backwards.

Bracts narrowly ovate-deltoid, thin, scarious, white, 5 mm. long, 2.5 mm. broad, obscurely 3-nerved.

Pedicels 5—6 mm. long.

Perianth yellow with greenish tips, cylindric-trigonus, averaging 20 mm. long, 6 mm. diam. across the ovary, thence slightly trigonus; *outer segments* free for 10 mm. (tube 10 mm.), obscurely 3-nerved, the nerves greenish, the apices subacute slightly spreading; *inner segments* broader than the outer and with more obtuse more spreading apices.

Filaments pale lemon, the 3 inner narrower and lengthening before the 3 outer with their *anthers* in turn exserted 3 mm.

Stigma at length exserted 4 mm.

Ovary light green, 3 mm. long, 2 mm. diam.

A. gracilicaulis Reynolds et Bally. Species nova, affinis *A. retrospiciens* Reynolds et Bally, caulibus longioribus, foliis longioribus canaliculatisque, racemis longioribus laxioribus, floribus patulis non retrospicientis differt.

Planta frutescens; caulis simplex vel a base ramosus, 3—4 met. longus. *Folia* c. 20, rosulata, ensiformia, 50—60 cm. longa, 8 cm. lata; *supra* glauco-virida, canaliculata; *subtus* convexa; marginibus dentibus albidis 1 mm. longis, 2—10 mm. distantibus armata. *Inflorescentia* c. 10-ramosa, paniculata, c. 60 cm. alta, ramis virgatis. *Racemi* cylindrici, 5—6 cm. longi, 5 cm. diametro. *Bracteae* ovato-acutae, 3 mm. longae, 2 mm. latae, albiae, 1—3-nervatae. *Pedicelli* 5—6 mm. longi. *Perianthium* luteum, cylindrico-trigonum, 18 mm. longum, circa ovarium 5 mm. diametro; *segmenta exteriora* per 12 mm. libera (tubus 6 mm.), obscure 3-nervata. *Antherae* 3—4 mm. exsertae. *Stigma* demum 4—5 mm.

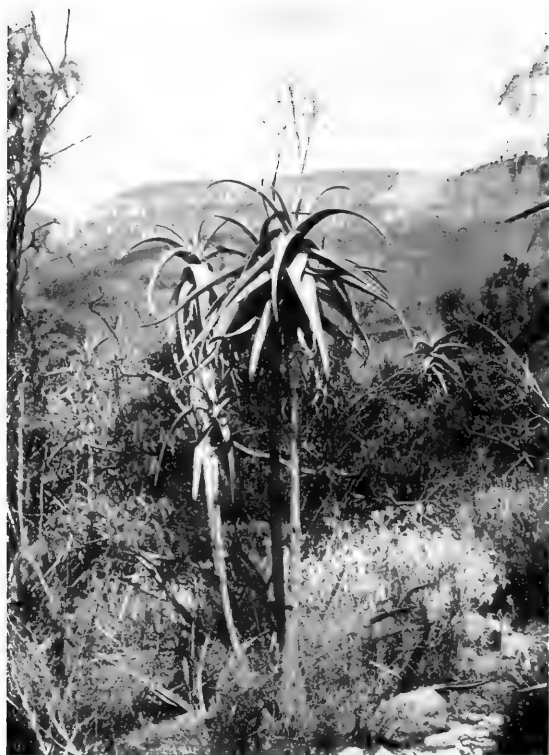


PLATE XXVII. *Aloe gracilicaulis* Reynolds et Bally
Plants in dry bush country, 19 miles north of Erigavo on road to Mait, alt. 3,800 ft.
Flowering in September 1957. Height 3 met.



PLATE XXVIII. *Aloe gracilicaulis* Reynolds et Bally
Flowers yellow, 1/1, from bud to post-pollination stage.

exserta; *Ovarium* viridulum, 5 mm. longum, 2 mm. diametro. (Plates XXVII, XXVIII.)

HABITAT: Somaliland Protectorate: In dry bush country 19 miles north of Erigavo on Mait road, alt., 3,800 ft., c. 10° 51' N., 47° 14' E., 9 Sept. 1957, Reynolds 8428 holotype (PRE), isotype (K, EA).

A. gracilicaulis grows in some numbers in dry bush country, on lower slopes of the Kol Hosis range, 19—20 miles northwards from Erigavo on the road down to Mait, between 3,800 ft. at mile 19, and 3,600 ft. at mile 20. Plants occur with stems simple or branched at base, the stems varying from 2—4 met. in height. Leaves are rather deeply channelled and recurved, while apices of lowest leaves point downwards. The inflorescence is a much-branched panicle with yellow flowers only 18 mm. long.

A. gracilicaulis is allied to *A. retrospiciens* at Darburruk (on the Hargeisa-Berbera road) but the latter has shorter slender stems, shorter less channelled leaves, and denser shorter capitate racemes with the flowers somewhat subsecund and pointing backwards.

A. medishiana Reynolds et Bally, at Medisha, 24 miles north-east of Erigavo, is a close ally, but this species has shorter less recurved leaves, longer (9 mm.) pedicels, and scarlet perianths with the outer segments free for only 6 mm.

The Somali name for *A. gracilicaulis* is *Daar der*, the tall Aloe.

DESCRIPTION: *Plant* with stem simple, or branched at base and becoming shrubby. *Stem* 2—4 met. tall, 8—10 cm. diam. near ground level, about 6 cm. diam. at the middle, glabrous except for persistent dried leaf remains for 30—50 cm. below the rosette of leaves.

Leaves about 20, rosulate, crowded at apex of stem, ensiform, basally sheathing, 8 cm. broad at base, gradually narrowing to an acute apex, 50—60 cm. long, youngest leaves erectly spreading, the oldest much recurved with their apices pointing downwards; *upper surface* unicoloured grey-green, flat at base, deeply canaliculate upwards; *lower surface* rounded; *margins* with 1 mm.-broad white cartilaginous border armed with white cartilaginous blunt teeth 1 mm. long, irregularly 2—10 mm. apart, usually more crowded low down, more distant upwards.

Inflorescence a branched panicle averaging 60 cm. tall, 2—3 simultaneously.

Peduncle basally plano-convex and 15 mm. broad, terete upwards, divaricately about 10-branched from below the middle, the 1—2 lowest branches with 3—5 branchlets, less rebranched upwards, the branches very slender (about 4 mm. thick).

Racemes cylindric, subdensely flowered, 5—6 cm. long, 5 cm. diam.,

youngest buds sub-erect and denser, slightly laxer downwards, open flowers nutant, whole raceme yellow.

Bracts ovate-acute, 3 mm. long, 2 mm. broad, white, scarious, 1—3-nerved.

Pedicels averaging 5—6 mm. long.

Perianth yellow, cylindric-trigonous, averaging 18 mm. long, 5 mm. diam. across the ovary, thence trigonous, the mouth open; *outer segments* free for 12 mm. (tube 6 mm.), thin at the margins, obscurely 3-nerved, apices sub-acute, slightly spreading; *inner segments*, free but dorsally adnate to the outer for 6 mm., broader than the outer, almost white with yellow keel, the apices more obtuse and more spreading.

Filaments white, the 3 inner narrower and lengthening before the 3 outer with their *anthers* in turn exerted 3—4 mm. *Stigma* at length exerted 4—5 mm.

Ovary pale green, 5 mm. long, 2 mm. diam.

A. medishiana Reynolds et Bally. Species nova, affinis *A. gracilicaulis*, caulibus brevioribus, foliis brevioribus supra leviter convexis, racemis pedicellisque longioribus, tubo brevior differt.

Planta frutescens, caulibus ad 2 met. altis, e basi ramosis. *Folia* c. 24, subrosulata, ensiformia, patentia vel decurva, usque ad 30 cm. longa, 5.5 cm. lata; *supra* viridula, planiuscula vel levissime convexa; *subtus* rotunda; marginibus dentibus cartilagineis 1 mm. longis, basi crebrioribus superne remotioribus armata. *Inflorescentia* saepe 2, c. 50 cm. alta, 6—8-ramosa. *Racemi* sublaxi, cylindrici, 8—10 cm. longi, 5 cm. diam. *Bractae* ovato-acutae, 2—3 mm. longae, 2 mm. latae, scariosae, albiae, 1—3-nervatae. *Pedicelli* 9 mm. longi. *Perianthium* coccineum, cylindrico-trigonum, 19 mm. longum, circa ovarium 5 mm. diametro; *segmenta exteriora* per 5—6 mm. libera (tubus 13 mm. longus). *Antherae* 1—2 mm. exsertae. *Stigma* demum 3 mm. exserta. *Ovarium* pallide brunneum, 4 mm. longum, 2.5 mm. diametro. (Plate XXIX.)

HABITAT: Somaliland Protectorate: Exposed rocky slopes at Medishe, 24 miles north-east of Erigavo, c. 10° 36' N., 47° 34' E., c. 4,800 ft. alt., 10 Sept. 1957, Reynolds 8441 holotype (PRE), isotype (K, EA).

A. medishiana was found by Mr. Bally in November 1954, and by myself in September 1957, in large numbers on exposed rocky slopes at Medishe, which is 24 miles north-east of Erigavo at about 4,800 ft. altitude. In floral characters it is closely allied to *A. gracilicaulis* at mile 19 from Erigavo on the road down to Mait, but *A. medishiana* differs in having shorter more spindly stems, leaves narrower and half as long, with the upper surface flat to slightly convex (not deeply canaliculate), longer pedicels, and red perianths with outer segments free for only 6 mm.

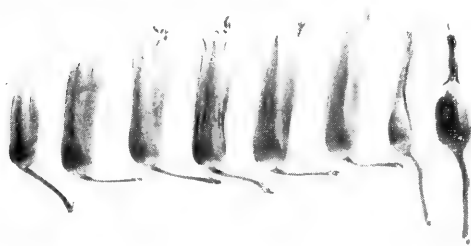
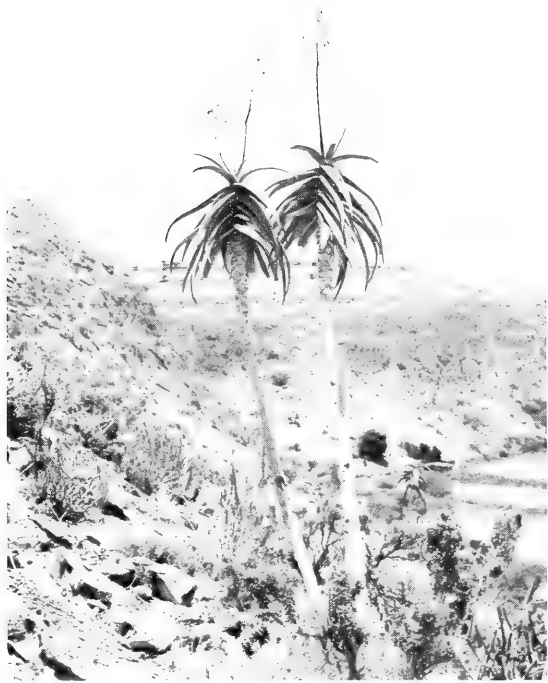


PLATE XXIX. *Aloe medishiana* Reynolds et Bally
 Plants on rocky slope at Medishe, 24 miles north-east of Erigavo. Height 2.25 met.
 Flowers red, 1/1, from bud to post-pollination stage.

Near Geldin in the far-eastern Al Madu, Mr. Bally has found plants with leaves 6.5 cm. broad, 38 cm. long, and with more capitate racemes (Bally B. 11142). This might belong here but further investigation is necessary.

The Somali name for *A. medishiana* is *Dawr der*, the tall Aloe.

DESCRIPTION: *Plant* sometimes with simple stem, but mostly with stems branched at base and of shrubby growth, the stem smooth, up to 2 met. tall, 3—3.5 cm. diam.

Leaves about 24, crowded along the apical 20 cm. of stems, ensiform, spreading to decurved, up to 30 cm. long, 5.5 cm. broad at base, gradually narrowing to the apex; *upper surface* grey-green, without spots or markings, flat to slightly convex; *lower surface* rounded, otherwise as in upper surface; *margins* with a continuous narrow white cartilaginous edge armed with very small firm white teeth that are about 1 mm. long and more crowded (5 mm. apart) low down, more distant (10 mm. apart) to obsolescent upwards.

Inflorescence a branched panicle about 50 cm. tall, sometimes 2 simultaneously.

Peduncle brown with a bloom, plano-convex and 15 mm. broad at base, branched at the middle or higher with 6—8 branches, the lowest of which sometimes with 3—5 branchlets, the whole inflorescence producing about 15 racemes.

Racemes cylindric, averaging 8—10 cm. long, 5 cm. diam., subclaxly flowered, the buds spreading, the open flowers nutant.

Bracts ovate-acute, 2—3 mm. long, 2 mm. broad, thin, dry, white, 1-nerved, or with a faint nerve on each side appearing as 3-nerved.

Pedicels averaging 9 mm. long.

Perianth dull scarlet, cylindric-trigonous, 19 mm. long, 5 mm. diam. across the ovary, thence very slightly curved and trigonous upwards; *outer segments* connate into a tube to beyond the middle (free for 5—6 mm. only), obscurely 3-nerved, the apices subacute and slightly spreading; *inner segments* broader than the outer and with more obtuse more spreading apices.

Filaments white, the 3 inner narrower and lengthening before the 3 outer with their *anthers* in turn exerted 1—2 mm.

Stigma at length exerted 3 mm. *Ovary* pale brown 4 mm. long, 2.5 mm. diam.

A. eminens Reynolds et Bally. Species nova, affinis *A. sabaeae* Schweinf. (Yemen), foliis brevioribus angustioribus dentibus crebrioribus,

racemis brevioribus, bracteis brevioribus 1-nervatis, pedicellis brevioribus, tubo longiore differt.

Planta alte arborescens, copiose ramosa, 10—15 met. alta, truncus basi usque ad 1·5 met. diam. *Folia* c. 16—20, rosulata, recurva, valde canaliculata, 40—45 cm. longa, 5 cm. lata; marginibus dentibus cartilagineis albidis 2—3 mm. longis, 3—5 mm. distantibus superne obsolescentis armata. *Inflorescentia* 50—60 cm. alta, 3—5-ramosa. *Racemi* conico-cylindrici, subdensi, c. 16 cm. longi, 8—9 cm. diametro. *Bracteae* anguste deltoideae, pallide brunneae, 6 mm. longae, 3 mm. latae, 1-nervatae. *Pedicelli* 10 mm. longi. *Perianthium* rubrum, cylindrico-trigonum, c. 40 mm. longum, circa ovarium 12 mm. diametro; *segmenta exteriora* per 32 mm. libera (tubus 6—8 mm. longus). *Antherae* 3—4 mm. exsertae; *stigma* demum 5 mm. exserta. *Ovarium* viridulum, 6 mm. longum, 4 mm. diametro. (Plates XXX—XXXII.)

HABITAT: Somaliland Protectorate: In a ravine of the Surud, west side of Tabah Pass, 11 miles north-west of Erigavo. c. 10° 46' N., 47° 14' E., 6,000 ft. alt., 9 Sept. 1957, Reynolds 8435 holotype (PRE), isotype (K, EA).

A. eminens occurs in numbers in sheltered well-wooded ravines of the Surud, 11 miles north of Erigavo at 6,000 ft., and repeatedly for the next 7 miles down the spectacular escarpment road (which leads to Mait on the coast) down to 4,500 ft. It was not seen in drier bush country at lower altitudes. Mr. Bally has also found it along the Al Madu range much further east.

A. eminens is a tree 30—40 ft. and more in height, and is irregularly branched and of somewhat straggly untidy growth. Sometimes a few slender very elongated branches stand out above the others. The leaves of young plants may be larger, but in mature specimens they are only 45 cm. long and 5 cm. broad, with a cartilaginous marginal edge armed with firm (not pungent) blunt white teeth that are 2—3 mm. long, 3—5 mm. apart, becoming obsolescent towards the apex. Racemes are sub-densely flowered and average 16 cm. long, while bracts are narrowly deltoid, only 6 mm. long and 1-nerved. Pedicels average 10 mm. long, and the perianths are 40 mm. long, rather thick and fleshy, and glossy red. At a quick glance *A. eminens* recalls *A. Bainesii* Th. Dyer in South Africa, but the latter is a quite different species with much larger leaves, densely flowered racemes 20—30 cm. long, bracts linear and coiled backwards, shorter perianths with anthers exserted 15 mm. and more.

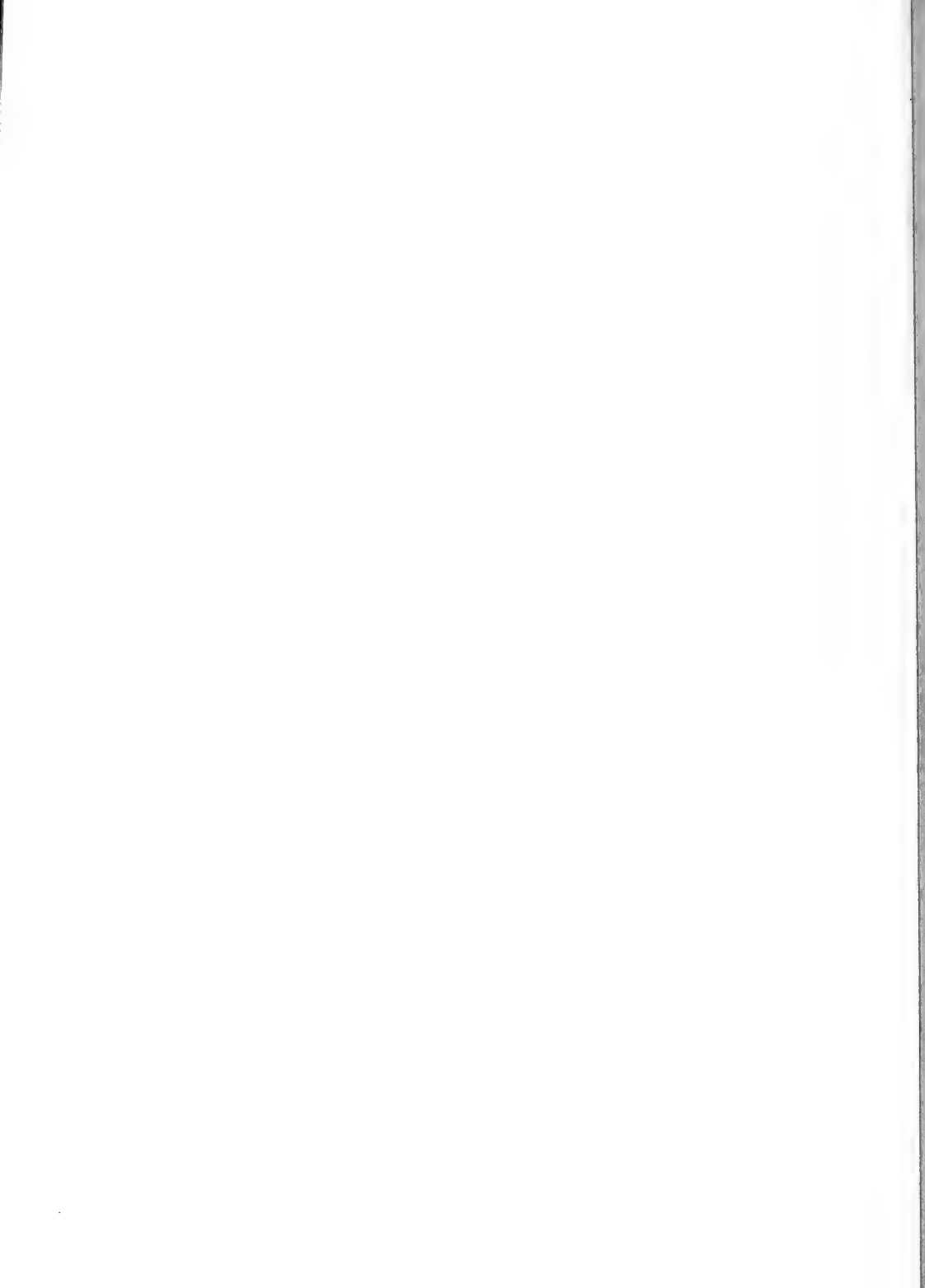
A. sabaea Schweinfurth from the Yemen is a closer ally. I have not seen plants, and this species is known to me only from Schweinfurth's and Berger's descriptions, and from the material in Kew of Schweinfurth



PLATE XXX. *Aloe eminens* Reynolds et Bally
In the Surud, 11 miles north-west of Erigavo, alt. 6,000 ft. (1,800 met). Height 15 met.



PLATE XXXI. *Aloe eminens* Reynolds et Bally
13 miles north of Erigavo on road to Mait, alt. 5,500 ft. (1,650 met.). Height 10 met.
Photo: Mr. P. R. O. Bally.



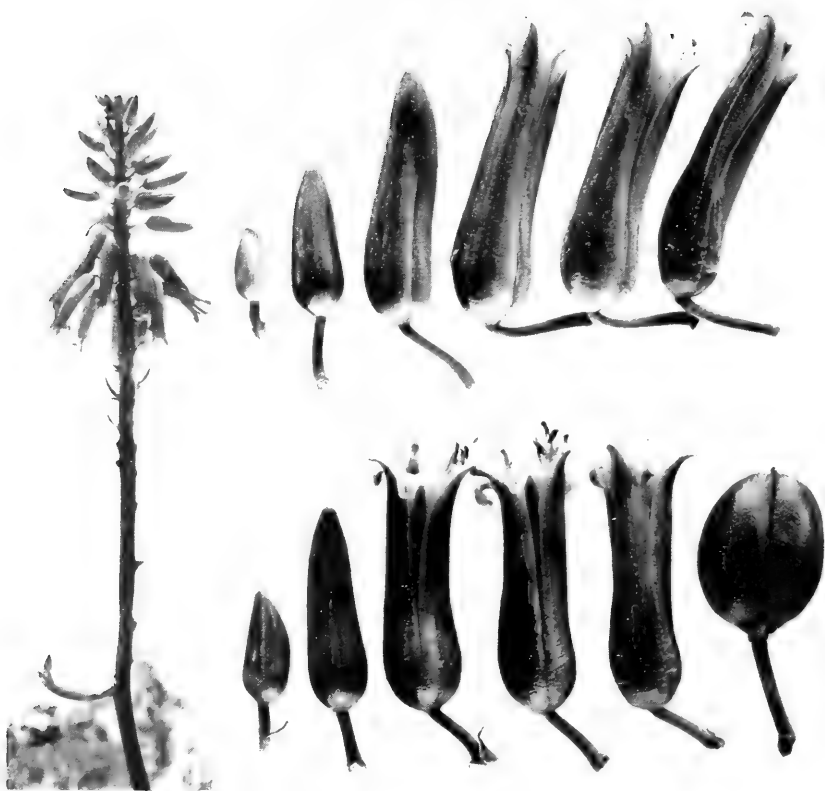


PLATE XXXII. *Aloe eminens* Reynolds et Bally
 Left: Raceme 1.5 approx. Right: Flowers 1/1 from bud to fruit stage, from 2
 different plants.

941 from the Yemen in Arabia. *A. sabaea* differs from *A. eminens* in having much larger leaves, more widely spaced teeth, longer racemes, much longer broader 5-nerved bracts, pedicels up to twice as long, shorter perianths with segments free almost to base ("tubo brevissime").

I had hoped to study *A. sabaea* in the Yemen, but hostilities along the Aden-Yemeni border made that impossible.

A. eminens flowers mostly from November to January, and is called *Daar der*—the tall Aloe—by the Somalis.

DESCRIPTION: A tree 10—15 met. high. *Stem* up to 1.5 met. diam. at ground level, more slender upwards, irregularly branched, the branches slender.

Leaves 16—20, rosulate at apices of branches, basally sheathing-imbricate, the imbricate portion with 5 mm. broad white border, about 5 cm. broad at base, 40—45 cm. long, gradually narrowing to an obtuse apex, the leaves recurved with their apices pointing downwards; *upper surface* unicoloured dull green, rather deeply canaliculate and "U"-shaped in cross section; *lower surface* rounded; *margins* with narrow white cartilaginous edge armed with blunt cartilaginous (not pungent) white teeth that are longer (2—3 mm. low down and 3—5 mm. apart, becoming smaller to obsolescent upwards except for a few short crowded teeth in the apical 4—5 cm.

Inflorescence branched, averaging 50—60 cm. high.

Peduncle basally plano-convex and 15 mm. broad, 3—5-branched from below the middle.

Racemes subdensely flowered, broadly cylindric-acuminate, averaging 16 cm. long, 8—9 cm. diam., the apex a tuft of dried bracts, the youngest buds suberect, older buds spreading, open flowers nutant.

Bracts narrowly deltoid, 6 mm. long, 3 mm. broad, pale brown, thin, scarious, 1-nerved, the nerve raised and prominent.

Pedicels averaging 10 mm. long.

Perianth red, somewhat glossy, rather thick and fleshy, cylindric-trigonus, averaging 40 mm. long, basally obtuse to rounded, 12 mm. diam. across the ovary, thence trigonus and slightly narrowing to the mouth; *outer segments* free for about 32 mm. (tube 8 mm.), the apices subacute and spreading; *inner segments* broader than the outer, obtusely keeled, with thin margins, the apices more obtuse and more recurved to revolute.

Filaments yellow, the 3 inner narrower and lengthening before the 3 outer with their *anthers* in turn exserted 3—4 mm.

Stigma at length exserted 5 mm.

Ovary pale green, 6 mm. long, 4 mm. diam.

Capsule 30 mm. long, 21 mm. diam. at the middle.

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APOMIXIS AS RELATED TO GEOGRAPHICAL DISTRIBUTION IN THE PANICOID GRASS TRIBES*

By WALTER V. BROWN

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A number of South African botanists and plant breeders have asked me why apomixis is so common among grasses of South Africa as indicated by Brown and Emery (1957). From the large number of apomictic species reported (25) in the relatively small number of species examined (50), it would seem to be true that apomixis is unusually common among grasses of that region.

In a subsequent paper, Brown and Emery (1958) have demonstrated that apomixis is apparently far more common in genera of the subfamily Panicoideae than in any other comparable group of the family (Table I). In the subfamily Festucoideae apomixis by agamospermy is evidently sporadic and is known to occur in only three genera in three different tribes. In contrast, apomixis appears to be a characteristic feature of the Panicoideae, occurring in many genera of the tribes Paniceae, Andropogoneae, Chlorideae, Eragrosteae, and Pappophoreae. Because of the apparent uniformity of mechanism (4-nucleate unreduced embryo sacs) and high frequency of apomictic species, Brown and Emery (1958) proposed the hypothesis that the same genes for apomixis are widely distributed among sexual as well as apomictic genera of these tribes and have been so since the origins of these tribes perhaps 100,000,000 years ago.

Almost without exception apomictic grasses are polyploid and perennial although many polyploid and perennial species are sexual. It was proposed, however, that many of the sexual (diploid, polyploid, perennial, and annual) species of the Panicoideae probably contain one or a few of the many genes necessary for an effective, balanced apomictic system. Such species would be sexual since they would lack most of the

* Too late for inclusion in this publication is knowledge of the paper by Jacques de Coulon, 1923; *Nardus stricta*; Etude physiologique, anatomique et embryologique; Mem. Soc. vaudoise des Sci. Nat. No. 6: 247-332. He demonstrated complete failure of pollination by abortion of stamens but normal seed production in some strains. Normal anthesis but inability to germinate pollen, no observable pollen tubes entering the embryo sac, and persistence of both synergids indicated apomixis in other strains. This is the first known report of apomixis in grasses. Since the embryo sac is a normal 8-nucleate type derived from a vacuolate megaspore mother cell and no evident aposporous embryo sacs, the process is diplospory without pseudogamy followed by parthenogenesis.

necessary genes for apomixis but they would, nevertheless, serve as carriers of one or more apomictic genes.

TABLE I
APOMICTIC GRASSES

Viviparous			
Agrostis			
stolonifera	V	Circum north polar	(13, 22)
tenuis	V	N. Europe	(13, 22)
Deschampsia			
alpina	V	N. Europe	(13, 22)
caespitosa	V	Circum north polar	(13, 22)
rhenana	V	N. Europe	(13, 22)
Festuca			
ovina	V	Circum north polar	(13, 22)
rubra	V	Circum north polar	(13, 22)
Poa			
bulbosa	V	Europe	(13, 22)
arachnifera	V	U.S.A.	(22)
jemtlandica	V	Europe	(13, 22)
arctica	V	Arctic	(13, 22)

Agamospermous

A = Aposporous

D = Diplosporous

FESTUCOIDEAE

FESTUCEAE

Poa			
alpina	D	arctic	(13, 22)
ampla	A	U.S.A.	(22)
arctica	A	arctic	(13, 22)
arida	A	U.S.A.	(22)
compressa	A	Europe	(13, 22)
glauca	D	U.S.A.	(22)
nemoralis	D	U.S.A.	(13, 22)
nervosa	D	U.S.A.	(12, 22)
palustris	D	Circum north polar	(13, 22)
pratensis	A	N. temperate	(13, 22)

AGROSTIDEAE

Calamagrostis			
canadensis	D	N. Amer.	(21, 22)
chalybaea	D	N. Europe	(20, 22)
inexpansa	D	N. Amer.	(21, 22)
langsдорffii	D	N. Asia	(21, 22)
lapponica	D	Europe	(20, 22)
purpurascens	D	N. Europe	(21, 22)
purpurea	D	N. Europe	(20, 22)

HORDEAE

Agropyron			
scabrum	D	New Zealand	(14)

PANICOIDEAE

(EUPANICOIDEAE)

ANDROPOGONEAE

Bothriochloa			
decipiens	A	Australia	(4)
ewartiana	A	Australia	(4)
intermedia	A	Africa to Australia	(2, 4, 7)
= caucasica?		Caucasus	(7)
= glabra?		S. Asia	(4, 7)
ischaemum	A	Europe to Formosa	(3, 4, 7)
pertusa	A	E. Africa, S. Asia	(2, 4, 7)
= inculpta?		E. Africa, S. Asia	(7)
radicans	A	Africa	(2, 4)
venusta	A	Ceylon	(4, 7)
Capillipedium			
parviflorum	A	Africa to Australia	(4, 7)
spicigerum	?		(7)
Dichanthium			
annulatum	A	N. Africa, China, Aust.	(2, 4, 7)
caricosum	A	S. Asia	(2, 4, 7)
nodosum	A	India	(4)
Heteropogon			
contortus	A	Mex., U.S., Africa	(2, 4, 9)
		Aust., India, Java	
Hyparrhenia			
hirta	A	Africa, S. Asia	(2, 4)
rufa	A	South Africa	(2, 4)
Saccharum			
officinarum	Not proved apomictic;	S. E. Asia	
spontaneum	Price, S. Unpublished.	S. E. Asia	
Themeda			
quadrivalvis	A	India	(4)
triandra	A	South Africa	(2, 3, 4)

MAYDEAE

Tripsacum			
dactyloides	D	U.S.A.	(4, 10)

PANICEAE

Anthephora			
pubescens	A	South Africa	(2, 4)
Brachiaria			
brizantha	A	South Africa	(2, 4)
serrata	A	South Africa	(2, 4)

Cenchrus			
setigerus	A	India	(11)
Echinochloa			
frumentacea	Occasional A	India	(25)
Eriochloa			
borumensis	A	South Africa	(2, 4)
sericea	A	U.S.A.	(4)
Panicum			
deustum	A	South Africa	(2, 4)
maximum	A	Africa	(4, 26)
obtusum	A	U.S.A.	(4)
virgatum	A	U.S.A.	(4)
Paspalum			
dilatatum	A	South America	(4, 16)
hartwegianum	A	Texas, Mexico	(4)
malacophyllum	A	South America	(4)
notatum	A	South America	(6)
serobiculatum	Occasional A	India	(26)
secans	A	America	(23)
Pennisetum			
ciliare	A	Asia, Africa	(11, 24)
clandestinum	A	Asia, Africa	(17)
orientale	A	Asia	(17)
purpureum	A	Asia, Africa	(2, 4)
ramosum	Occasional A	Asia, Africa	(17)
setaceum	A	Asia, Africa	(17)
villosum	A	Asia, Africa	(17)
Setaria			
leucopila	A	U.S.A.	(8)
villosissima	A	U.S.A.	(8)
Tricholaena			
monachne	A	South Africa	(2, 4)
Urochloa			
bolbodes	A	South Africa	(2, 4)
mosambicensis	A	South Africa	(2, 4)
pullulans	A	South Africa	(2, 4)
trichopus	A	South Africa	(2, 4)

PANICOIDEAE

(CHLORIDOIDEAE)

CHLORIDEAE

Chloris			
gayana (4n)	A	Africa	(2, 4)
Bouteloua			
curtipendula	A	U.S.A.	(4, 5)
Buchloë			
dactyloides	Occasional A	U.S.A.	(4)
Fingerhuthia			
africana	D	South Africa	(2, 4)

ERAGROSTEAE

Eragrostis			
chloromelas	D?	South Africa	(2, 4)
curvula	D?	South Africa	(2, 4)
heteromera	D?	South Africa	(2, 4)

PAPPOPHOREAE

Schmidtia			
bulbosa	?	South Africa	(2, 4)
kalahariensis	?	South Africa	(2, 4)

Hybridizations among such carrier species would occasionally bring together in polyploid hybrids all necessary genes for effective apomictic systems. Because apomixis is essentially restricted to polyploid forms, it has been assumed that polyploidy provides a genetic environment in which apomixis is best able to be expressed (Stebbins, 1950).

The sexual parental forms together with the hybrid apomictic "micro-species" constitute an agamic complex within the genus. Although the sexual ancestral forms may be typical species and treated as such taxonomically, the apomictic derivatives form a polymorphic complex within which species in the usual sense do not exist (Stebbins, 1950).

If the above hypothesis is correct, if apomixis in the Panicoideae is more than just the sporadic development of agamic complexes, a large number of apomictic species would be expected in these tribes (Table 1). Even the percentage of apomictic species should be high, as high as 25 to 30 per cent of all species as reported by Brown and Emery (1958). Evolution within these tribes is characterised, therefore, not only by polyploidy but also by apomixis, the two being intimately related and producing many agamic complexes. Apomixis, like polyploidy, is a major factor in the species problem and is a dominating feature of taxonomic considerations of apomixis-containing genera.

Apomictic Panicoideae, abundant in South Africa, are not lacking, however, in the New World: *P. dilatatum* and *P. notatum* (Burton, 1948); *Bouteloua curtipendula* (Bryant, 1952); *Tripsacum dactyloides* (Farquharson, 1955); *Setaria leucopila* and *S. villosissima* (Emery, 1957); *Paspalum secans* (Snyder, 1957); *Eriochloa sericea*, *Panicum obtusum*, *P. virgatum*, *Paspalum hartwegianum*, *P. malacophyllum*, and *Heteropogon contortus* (Brown and Emery, 1958). There are 13 New World apomictic Panicoideae now known, but 30 have been reported from the Old World (Brown and Emery, 1957; Narayan, 1951; Snyder *et al.*, 1955; Warmke, 1954). From present information it appears that apomictic species are more common among Old World than among the New World panicoid

grasses. But whether this present knowledge reflects a true picture or a distorted one is not now known because of too limited data. The New World species examined constitute a truer representative sample of the whole population than the Old World species since the latter were selected by the unknown original seed collectors as possible forage grasses for introduction in the United States. They are, therefore, mostly polyploid and perennial, and selection for desirable forage types may have constituted unintentional selection for apomixis.

Among the Andropogoneae the evidence strongly indicates a greater concentration of apomictic species in the Old World. The only known native apomictic species of Andropogoneae in the New World is *Heteropogon contortus*, a species also native in the Old World. If our present knowledge of the geographical distribution of apomixis in the Andropogoneae represents a reasonably true picture, it is possible to correlate apomixis with the length of time representatives of Andropogoneae have occupied the various continental areas. Hartley states (1950) that, "Sub-normal values (of species in the grass flora) are particularly common in the tropical parts of the American continent, suggesting that the tribe may not yet have attained its maximum development in the western hemisphere. This supposition is supported by the fact that the localities in which the percentage of species of Andropogoneae in the grass flora is more than twice the normal figure are grouped together in the south-east Asia region. The Andropogoneae are generally recognised as the most advanced of the major grass tribes and the data suggest that they have spread outward from a centre of distribution in south-east Asia and have not yet attained full development in distant regions." His Fig. 3 indicates that the Andropogoneae are represented in the African grass flora in an above-normal percentage. It is possible, therefore, that apomictic species are more abundant toward the centre of distribution of the tribe, that is, in Southern Asia and also in Africa, but less abundant in distant regions, the Americas.

As species of a genus or tribe spread outward from a centre of origin the sexual species, and especially diploid species (Gustafsson 1946-47), as a result of their variability, should be able to occupy a variety of new habitats and therefore migrate rapidly. Obligate apomictic taxa, on the other hand, would have very little variability. Facultative apomicts have some variability but less than sexual species. Apomictic taxa would be left behind in the original habitats for which they were adapted and to which they had become restricted. Sexual types that might or might not be carriers of apomictic genes would constitute the majority of taxa at the periphery of the occupied area and would give rise to the new species in the more recently occupied regions. It may be that the rela-

tively few American species of Andropogoneae represent rather recently arrived taxa that have not had time to produce many agamic complexes although genes for apomixis may be present in the gene pools of some of the genera.

On the other hand, providing constancy of environments, the apomicts in the original Old World areas might have been extremely well adapted and have accumulated in great number of species and individuals. The sexual diploid progenitors may now have been eliminated by the apomicts, may be restricted to small areas, or may be common within the ranges of the apomicts.

In the Paniceae, on the other hand, there are known to be 12 apomictic species in the western hemisphere and about 17 in the eastern, an approximately even distribution around the world (Table 1). Hartley (1950) reported species of Paniceae in above normal percentages in the hot moist regions of both hemispheres, "having originated probably in eastern tropical America and having spread widely through the moist tropical regions of the world". If large numbers of apomictic species are correlated with extremely long occupancy of a region, it is likely that the tribe Paniceae is a very old group that has been well established in both hemispheres for a very long time.

Although apomixis has been reported in three tribes of the Chloridoideae (Chlorideae, Eragrosteae, and Pappophoreae), too few species have been studied for generalisations to be made. All but one of the presently known apomicts in these tribes are South African. Hartley concluded for the Eragrosteae that, "There is thus no indication that the tribe has failed to achieve its full potential expansion in most parts of the world", being especially, "abundant in regions of high winter temperature and low rainfall". It is likely that the same conclusion would apply equally well to the Chlorideae and Pappophoreae.

The above hypothesis that relates apomixis with the centre of origin of an expanding tribe is not supported by evidence from the genus *Crepis* (Babcock, 1947). The centre of origin of that genus, in fact of the whole subtribe Crepidineae, is Central Asia, but the only known apomictic species of *Crepis* are native in Western United States, apparently on the periphery of the range of the genus. Stebbins and Babcock (1939) stated, however, that diploid species of *Crepis* reached America and then acquired polyploidy and apomixis more or less simultaneously. *Crepis* is, essentially, a diploid genus with essentially no polyploidy among the species of the most primitive sections in Asia. Lack of apomixis among the primitive species may be correlated with lack of polyploidy, or, on the other hand, apomixis may have arisen spontaneously by mutations and hybridisa-

tions in America. There may not be genes for apomixis in the gene pool of the genus as a whole, although two other genera of the subtribe Crepidineae contain apomictic species, *Taraxacum* and *Hieracium*. The sexual and apomictic species of *Taraxacum* occur naturally in Eurasia, essentially the region of origin. The apomictic species of *Hieracium* are found in the area of origin of the tribe with only sexual species (as far as known) in distant regions. It is possible, therefore, that the distribution of sexual and apomictic species of the subtribe Crepidineae of the Compositae supports the hypothesis proposed here for tribes of the Gramineae.

Apomixis is known to occur in many other plant families and genera. Too little is known about the methods of reproduction in most species of such families and the relationships of reproductive methods to geographical distribution are not well enough known to warrant the use of such information as a test of the hypothesis at this time. It is quite likely, however, that certain tribes of the Compositae may have apomictic genes widely distributed among their genera as seems to be true of tribes of Panicoideae of the Gramineae.

South Africa, then, is a region favoured by many apomictic grasses. It lies within or close to the original area of the Andropogoneae, the Paniceae have been present in its flora long enough for apomixis to have become well established, and the Chloridoideae have found suitable habitats in its drier regions. It is quite likely that the grass flora of Southern Asia is characterized by a high percentage of apomictic species for the same reasons.

The hypothesis presented here is tentative and needs a great deal of testing. At present only a very small fraction of the thousands of species of Panicoideae have been examined or tested for apomixis. There is little doubt but that many more species will be found to be apomictic but it will be a long time before any relationships between apomixis, age, and geographical area will be known for certain. In the meantime, a large number of known and unknown agamic complexes need to be studied in detail to determine: the relationships among sexual and apomictic taxa; the nature of apomixis, whether obligate or facultative in individual plants, microspecies, and species; the constancy of the 4-nucleate unreduced embryo sacs in the subfamily; the genetics of apomixis including segregation of apomictic and sexual types in generations following crosses; further study of the interrelationships among apomixis, hybridization, and polyploidy; and the relationships between apomixis and geographical distribution at the specific, generic, and tribal levels.

Such studies could also result in some improved true-breeding forage varieties such as have come from the studies of apomixis in *Poa* by the

Carnegie Institution of Washington, Department of Plant Biology, under the direction of Dr. Jens Clausen at Stanford, California.

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THE IDENTITY OF *PROTEA LAURIFOLIA* THUNB. AND ITS AFFINITY TO TWO OTHER SPECIES OF *PROTEA*

By H. B. RYCROFT

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(With Plates XXXIII—XXXV)

Protea laurifolia Thunb., Proteae, plantae generis, species novae descriptae in *Nova Acta. Acad. Scient. Imper. Petropol.* XV., 462, Tab. VI, Fig. I, St. Petersburg (1806).

P. marginata Thunb. non Lam. in *Hoffm. Physiograph. Blatt*, I, 15 (1803), *Fl. Cap.* 508 (1813), ed. Schult, 138 (1823), Phillips & Stapf in *Fl. Cap.* V, i, 563 (1912), Dyer in *Fl. Plts. Afr.* XXIX, Pl. 1147 (1953).

The name *P. marginata* Thunb. (1803) is invalidated because the specific epithet was used by Lamarck (*Illustr.*, i, 235, 1791) twelve years earlier for another species, *P. arborea* Houtt.* The latter is figured in *Bot. Mag.* V, 51, Pl. 2447 as *P. marginata*.

In 1806, however, Thunberg published a description of *P. laurifolia*, using almost the same words as he did for the description of *P. marginata* three years earlier. As the name *P. marginata* Thunb. is invalid and as the specific epithet *laurifolia* was not used for any *Protea* before 1806, that name must be accepted for the species under consideration.

Photographs, kindly sent by the Botanical Museum of the University of Uppsala, Sweden, of *P. marginata* Thunb. in Thunberg's herbarium and of the plate of *P. laurifolia* Thunb. published in 1806, clearly indicate that the specimens are of the same species.

There is only one specimen in Thunberg's herbarium (Plate XXXIII) and according to Juel (*Plantae Thunbergianae*, Uppsala, 1918) it was used for the description of *P. marginata* and for the description and drawing of *P. laurifolia* (Plate XXXIV). This specimen with "e Cap. b. Spei, Thunberg" written on the reverse of the sheet is therefore the type of *P. laurifolia* Thunb.

* According to Merrill (*Jnl. Arnold. Arbor.* XIX, 332, 1938) the common "Waboom" was named *P. grandiflora* in 1781 by Thunberg (*Prot.* 56). This name was also used by Phillips and Stapf in *Fl. Cap.* V, i, 580 (1912). In 1775, however, Houttuyn named the same species *P. arborea* (in *Nat. Hist.* II, iv, 107.). *P. arborea* Houtt. is therefore the valid name.

There is no reference to *P. laurifolia* in Index Kewensis (1895) but it is listed in Supplement VIII, 1926-30 (1933) and in Index Londonensis, Vol. V (1931).

The nearest affinities to *P. laurifolia* Thunb. are *P. neriifolia* R. Br. and *P. lepidocarpodendron* Linn. The three species are closely related and intermediate forms between any two are occasionally found, but each is sufficiently distinct to be regarded as a separate species.

P. laurifolia differs from *P. neriifolia* and *P. lepidocarpodendron* by having, as a rule, a wider and more coriaceous, glaucous leaf with a decided mucronate apex. The margin is usually thickened and on drying the leaf assumes a pinkish or maroon tinge. White hairs are usually to be found in the dark apical beards of the involucre bracts (Plate XXXV).

P. lepidocarpodendron has the smallest capitulum. Its leaves resemble those of *P. neriifolia* but are usually narrower and on drying become darker. In addition to the apical beards on the innermost involucre bracts which are common to all three species, a few millimetres at the apex of each bract are covered with short, black tomentum.

Of all the Western Cape species of *Protea*, *P. laurifolia* extends furthest to the north. It is found in the Divisions of Calvinia, Van Rhynsdorp, Clanwilliam, Piquetberg, Ceres, Laingsberg, Ladismith, Tulbagh, Worcester, Robertson, Montagu, Malmesbury and Paarl. It has not been found further south than the Franschhoek area. The other two species are more southern and eastern in their distribution although specimens of *P. neriifolia* have been collected in isolated places in the Worcester and Ceres Divisions. These require further investigation.

P. laurifolia is cultivated very successfully in the National Botanic Gardens of South Africa at Kirstenbosch where it hybridises freely with *P. neriifolia*. Natural hybrids between *P. laurifolia* and *P. barbigera* have been observed in the Divisions of Montagu and Tulbagh.

ACKNOWLEDGMENT

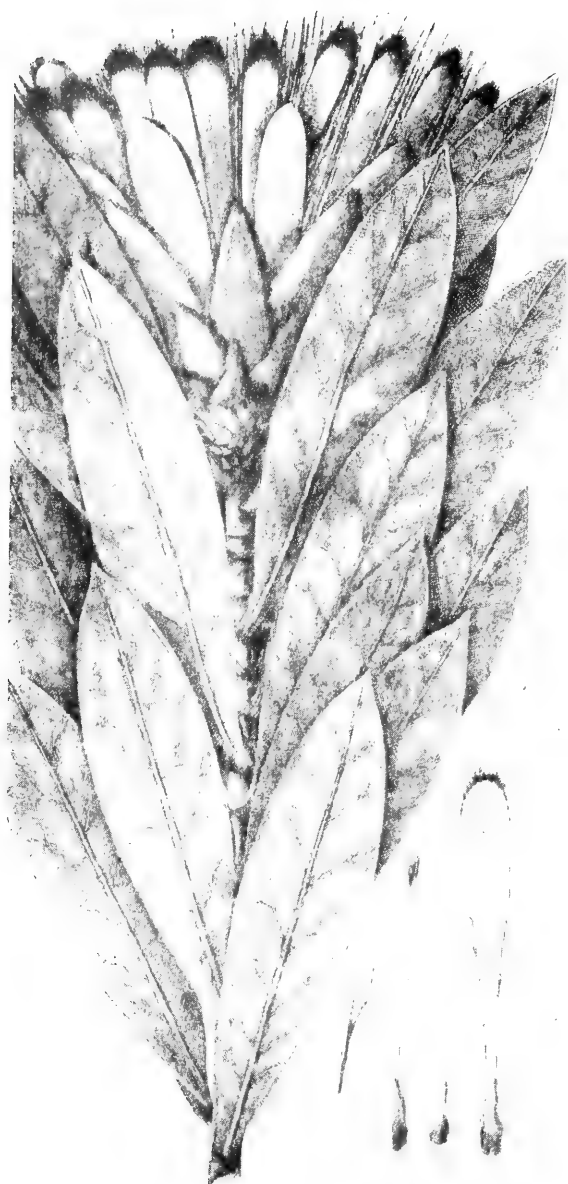
My sincere appreciation is extended to Dr. Carl G. Alm, of the Botanical Museum of the University of Uppsala, Sweden, for valuable information about *P. laurifolia* in Thunberg's herbarium and for various photographs, two of which appear in this paper.



PLATE XXXIII.

The type specimen of *Protea laurifolia* in Thunberg's Herbarium, Uppsala. On the front of the sheet is written "*P. melaleuca* Brown." "*speciosa* β . Diss." and "*Protea marginata*" and on the reverse, "e Cap. b. Spei, Thunberg."

—By courtesy of the Botanical Museum of the University of Uppsala, Sweden.



PROTEA *laurifolia*

Tab. VI. *P. laurifolia*: foliis oblongis callosis - acutis marginatis glabris, caule villoso, calycis squamae extus nigro - barbatis.

Frutex rigidus, hirsutus, simplex, erectus, pedalis et ultra.

Folia sparsa, subpetiolata vel basi angustata, oblonga, acuta cum callo, glabra, nervosa, nervo medio et marginali flavescentibus, viridia, erecta, sesquidigitalia.

Capitulum terminale, solitarium, oblongum, maximum.

Squamae calycinae tomentosae; exteriores ovatae, acutae; interiores lineares, apice spatulato - dilatatae, sub apice extus et margine nigro - barbatae.

PLATE XXXIV.

Description of *P. laurifolia*, and Plate VI in Nova Acta Acad. Scient. Imper. Petropol. Vol. XV, p. 464 St. Petersburg, 1806.

—By courtesy of the Botanical Museum of the University of Uppsala, Sweden.



PLATE XXXV.
Protea laurifolia Thunb., cultivated at Kirstenbosch, May 1958.

FRANCIS MASSON, A GARDENER-BOTANIST WHO COLLECTED AT THE CAPE

By MIA C. KARSTEN

(With Plates XXXVI and XXXVII)

I. BIOGRAPHICAL ACCOUNT

A history of the botanical exploration of the Cape during the period 1772 up to 1795, but particularly the years 1772-75, in which the Swedes CARL PETER THUNBERG and ANDERS SPARRMAN, whom we have already dealt with in this Journal, are outstanding personalities, would certainly fall short if no tribute were paid to their contemporary FRANCIS MASSON for his valuable contributions towards the knowledge of Cape botany, and for introducing numerous species of Cape plants into European gardens. We may well call that period the era of THUNBERG, SPARRMAN and MASSON.

Unlike THUNBERG and SPARRMAN, MASSON could not pride himself on an academical education. A man of simple birth, he has had but little opportunity of developing his natural gifts, at least in his youth. But during the years of his extensive travelling and collecting MASSON undoubtedly mastered a fair knowledge of botany and, as FORBES¹ puts it, "attained a position where he was held in esteem, and probably in friendship, by men of learning who had been more fortunate in birth and education than he".

GEORGE FORSTER,² however, at first showed but little appreciation for MASSON's achievements, obviously looked down upon him. In his introduction to the German edition (1784)³ of SPARRMAN's *Voyage to the Cape*, etc., he mentions that aboard the same ship (the *Resolution*), which took him (and his father) on a voyage round the world, was "a Scots garden-hand named Masson". And he cannot help hinting at MASSON's lack of education by asserting that the report of his travels at the Cape had been cleansed of its errors in spelling before publication by his patrons

¹ V. S. FORBES, *Masson's Travels*, S.A. Geogr. Journ., Vol. XXIX, April, 1947, p. 18.

² J. G. A. (GEORGE) FORSTER and his father J. R. FORSTER, German naturalists. See this Journal, Vol. XXIII, April, 1957, p. 47. Being German, the younger FORSTER's name should actually be spelled GEORG.

³ ANDREAS SPARRMANS, *Reise nach dem Vorgebirge der guten Hoffnung, den südlichen Polarländern und um die Welt, hauptsächlich in den Ländern der Hottentotten und Kaffern in den Jahren 1772 bis 1776*. Translated from the original Swedish (*Resa till Goda Hopps-Udden, Södra Pol-kretsen Och Omkring Jordklotet*, etc.—Stockholm, 1783-1802) by C. H. GROSSKURD. Edited and provided with an introduction by GEORG FORSTER.—Berlin, 1784.

in Philosophical Transactions. Judging by what he writes about it, FORSTER did not think much of MASSON's report: "I have not yet come across a translation [into German] of this poor product, and if all our publishers who are only too eager to print almost anything,⁴ really had rejected it, then this would fully establish its value for our public, so that we need not waste words over it". After this he grudgingly admits that "only for the natural philosopher does it contain a few useful indications, in so far as one can rely on the honesty of the author in things which are not above his comprehension". Later on, however, in his letter to BANKS of January 30, 1786, which one will find included in this paper, FORSTER appears to have changed his opinion of MASSON much to the better.

In the custody of the library of the University of Uppsala, there are the originals of three letters MASSON wrote to THUNBERG. These were published in this Journal as part of our paper on THUNBERG,⁵ but as they cover MASSON's second sojourn at the Cape, of which no report has been written, we think it justified to include them also in this biographical account. They are of interest not only because of the valuable additional information they provide, but also for the spelling-mistakes they contain, which gives credence to FORSTER's statement.

As we shall see later, MASSON was on friendly terms with THUNBERG, the Father of Cape Botany. In his letters and other writings MASSON clearly shows his respect for Doctor THUNBERG, whom he accompanied on two of his journeys into the interior of the Cape. But it was the great LINNAEUS whom he worshipped above all. He took an obvious delight in his correspondence with the Archiater.

Little is known about his relations with SPARRMAN. MASSON arrived at the Cape on October 30, 1772, as much as 6½ months after SPARRMAN who, at the time of MASSON's arrival, had not yet returned from his journey to the Paarl. They apparently had not the opportunity of seeing one another before SPARRMAN set out on his long voyage to the Antarctic and round the world as assistant to the FORSTERS on November 22. We did not come across any reference to such meeting, neither in MASSON's nor in SPARRMAN's writings. When SPARRMAN returned to the Cape in March 1775, MASSON was still there and then they met as revealed by their letters. But nothing is known of any collecting trip on the Peninsula made together.

MASSON undoubtedly was a more sturdy character than SPARRMAN. Unlike the latter he was a man of quiet disposition who, as may be

⁴ Free translation of the German "schreibseligen Fabriken", which literally means "factories with passion for writing".

⁵ This Journal, Vol. V, January, 1939, pp. 23-26.

gathered from his writings, believed in a more simple mode of life. He was less ambitious than SPARRMAN and not so keen on gathering money. But he acquitted himself of his task as a plant-collector with utmost zeal, in spite of the fact that the stipend which could be obtained for him was hardly adequate. His work meant everything to him. SPARRMAN took it altogether easier. With reference to SPARRMAN's letters to THUNBERG and LINNAEUS, one of our correspondents made the remark that SPARRMAN always seemed to make excuses for doing nothing.

MASSON has shown himself a gifted draughtsman—a most useful talent for a natural historian and traveller, especially in a time when there was no such thing as a camera.

The best and most comprehensive published account of MASSON's life and work is undoubtedly that by Sir JAMES EDWARD SMITH⁶ in *Rees's Cyclopaedia* (1819), which may be reproduced here for the greater part.

“FRANCIS MASSON, a name which ranks very high among those who, by encountering personal difficulties and hardships, with the most indefatigable and disinterested zeal, have promoted botanical knowledge, was born at Aberdeen in August 1741. Whether he was originally educated

⁶ Sir JAMES EDWARD SMITH, physician and botanist, born in Norwich in 1759, was the son of a wealthy non-conformist wool merchant. In 1781 he was sent to the University of Edinburgh to study medicine. Here he attended the lectures in botany given by Dr. JOHN HOPE, one of the earliest teachers of the Linnean system. In September, 1783 he came to London to study under JOHN HUNTER and Dr. W. PITCAIRN, with a letter of introduction from Dr. HOPE to Sir JOSEPH BANKS. On the death of the younger LINNAEUS in 1783, the whole of the library, manuscripts, herbarium and other natural history collections made by LINNAEUS father and son, were offered by LINNAEUS's widow to BANKS for a thousand guineas. BANKS declined the offer, but on his recommendation SMITH purchased the collections which ultimately arrived in October, 1784. The total cost, including freight, was £1,088. It is stated (*Memoir and Corresp. of Sir J. E. Smith*, edited by Lady SMITH, i, 126) that GUSTAVUS III of Sweden, who had been absent in France, hearing of the dispatch of the collections, vainly sent a belated vessel to the Sound to intercept the ship which carried them. The collections were originally housed in SMITH's apartments in Chelsea. After a continental tour (1786–87) SMITH left Chelsea in order to practise medicine in London. He took a house in Great Marlborough Street, to which the collections were removed. The year 1788 saw the foundation of the Linnean Society of London. SMITH was one of the founders and the Society's first president.

From 1788 SMITH gave lectures at his own home in botany and zoology, later on he became a lecturer in botany at Guy's Hospital. From 1800 he contributed botanical articles to *Rees's Cyclopaedia*. In 1796 he retired to his native city, Norwich, only coming to London two or three months in each year to deliver his annual course of lectures at the Royal Institution. In 1814, when the Prince Regent (GEORGE AUGUSTUS FREDERICK, afterwards KING GEORGE IV) became patron of the Linnean Society, SMITH received the honour of knighthood. As his most important work should be mentioned the *Flora Britannica*, in three 8vo vols., 1800–1804. He died in Norwich in 1828.

The above records have been taken from the biographical account of SMITH by G. S. BOULGER in *Dictionary of National Biography* (1898). We may add that the Linnean collections, including abt. 15,000 plants and abt. 3,000 letters, are now housed in Burlington House, Piccadilly, the Linnean Society's present seat.

as a gardener, or at what time he found his way to London, we are not informed. It appears that, having been for some time known to the late excellent superintendent of the Royal Garden at Kew, Mr. AITON,⁷ and probably employed under him there, he was fixed upon as a fit person to undertake some botanical expedition, for the purpose of enriching that collection, when the return of the celebrated BANKS and SOLANDER⁸ from their voyage round the world, gave a popularity and a stimulus to every exertion in favour of natural science. We believe the establishment of a travelling botanist in the king's service, if not suggested by the first-mentioned of these eminent men, was planned entirely under his advice and direction. In 1771 or 1772, Mr. MASSON was dispatched to the Cape of Good Hope. That country had been, for near a century, celebrated as a mine of botanical riches, which had scarcely reached our gardens but through the medium of those of Holland. The works of HERMANN, COMMELIN, BURMANN, BREYNIUS,⁹ and others,

⁷ WILLIAM AITON (1731-1793), botanist, was born in Lanarkshire in Scotland and brought up as a gardener. In 1754 he came to London in search of employment, and was engaged as an assistant by PHILIP MILLER, then gardener to the Botanic Garden at Chelsea. In 1759 he was appointed to the management of the Botanic Garden at Kew, which was then in the possession of the Princess Dowager of Wales (i.e. PRINCESS AUGUSTA, widow of FREDERICK LOUIS, Prince of Wales, son of GEORGE II). He soon raised the position of the garden to one of importance. He took every opportunity of increasing the collections, and it certainly was at his suggestion that MASSON was sent out to the Cape as a botanical collector. In 1783 he was promoted to the management of the forcing and pleasure gardens at Kew and Richmond, at the same time retaining his former post, a house being built for him at Kew by GEORGE III. In 1789 he published the *Hortus Kewensis, being a Catalogue of the plants cultivated in the Royal Garden at Kew*, in 3 vols., 8vo, with 13 plates. An important work, containing an enumeration of no less than 5,600 species, to which he devoted, using his own words, "a large proportion of the leisure allowed by the daily duties of his station during more than sixteen years." A second edition, in 5 vols., appeared in 1810-13, edited by his eldest son, WILLIAM TOWNSEND (1766-1849), botanist. AITON received the assistance of Dr. SOLANDER, then curator of Sir JOSEPH BANKS's herbarium, to whom the plants from Kew, as well as from other important gardens were sent to be named. He was also helped by DRYANDER. The *Hortus Kewensis* is of historical value on account of the care with which the dates of the introduction of the plants enumerated were ascertained by AITON, not only from books, but also from personal inquiry among his contemporaries. His eldest son succeeded him. This biographical account we owe to JAMES BRITTEN (*Dictionary of National Biography*, 1885).

⁸ DANIEL SOLANDER, see this Journal, Vol. XXIII, Oct., 1957, p. 136.

⁹ PAUL HERMANN (HERMANNUS), *Horti Academici Lugduni-Batavi Catalogus*, etc. (1687), containing small engravings of as many as 34 Cape plants; *Paradisus Batavus, innumeris exoticis curiosis herbis* (1698), published posthumously, with many illustrations, including a few Cape plants.—HERMANN, a physician and professor of botany at Leyden University, was born at Halle in Saxony in 1646 and died at Leyden in 1695. At the expense of the province of Holland he made a journey to the East Indies and Ceylon from 1672-1680, with the usual stop at the Cape. LINNAEUS'S *Flora Zeylanica* (1747) is based on HERMANN's collections.

JAN COMMELIN, *Horti Medici Amstelodamensis Rariorum . . . Plantarum . . . Descriptio et Icones* (1697-1701): a posthumous work in 2 vols., containing coloured pictures of many Cape plants, continued by his nephew CASPAR COMMELIN (see below) and published by FRANÇOIS KIGGELAER and F. RUYSCH.—JAN (JOHANNES)

had sufficiently evinced the abundance of these treasures; but comparatively few of them had been procured in a living state, or cultivated with success, even by the Dutch themselves; and of those but a very small portion had, from the time of the first Earl of Portland,¹⁰ when he came over with king WILLIAM, to our days, come into general cultivation in England. The writer of this well recollects the pleasure which the novel sight of an African Geranium [*Pelargonium* !], in Yorkshire and Norfolk, gave him about forty years ago. Now every garret and cottage-window is filled with numerous species of that beautiful tribe, and every greenhouse glows with the innumerable bulbous plants and splendid heaths of the Cape. For all these we are principally indebted to Mr. MASSON, besides a multitude of rarities, more difficult of preservation or propagation, confined to the more curious collections. Many of these perhaps have only survived to bloom once or twice within the walls to which they were first consigned; to be defined and named by the skill of a SOLANDER, a DRYANDER,¹¹ or of the younger LINNAEUS in his transient visit among us,¹² and have then disappeared. Such has unavoidably

COMMELIN or COMMELIJN (1629-1692), an apothecary and merchant at Amsterdam, became a botanist of distinction. In 1690 he was appointed "director-practicus" of the Hortus Medicus (the later Hortus Botanicus of Amsterdam University). He is the author of several botanical publications, of which the above-mentioned work is the best known.

CASPAR COMMELIN, *Praeludia Botanica ad Publicas Plantarum Exoticarum Demonstrationes* (1703), and *Horti Medici Amstelædamensis Plantae Rariores et Exoticae* (1706), a further continuation of the work started by his uncle. Both works, which are illustrated, contain some pictures of Cape plants.—C. COMMELIN (1667-1731), studied botany at Amsterdam, was appointed botanist of the Hortus Medicus in 1796 and professor of botany at Amsterdam in 1706.

JAN BURMAN, *Decades Rariorum Africanarum Plantarum* (1738-39), containing 100 excellent pictures of South African plants.—BURMAN (1707-1779) was a professor of botany at the Athenaeum Illustre (the later University) at Amsterdam. See also this Journal, Vol. V, January, 1939, p. 4, and Vol. XXIII, April, 1957, p. 57 (footnote 22).

Jacobi Breyneii Gedanensis Exoticarum aliarumque minus cognitarum Plantarum, Centuria Prima, etc. (1678); a fine folio printed on paper almost as thick as cardboard and in magnificent type, containing descriptions and figures of no less than 48 well-marked Cape plants.—JAKOB BREYNE (1637-1697), better known under the latinized name of BREYNIUS, was a wealthy merchant of Dantzic, known for his interest in natural history. He is the author of a few botanical works of which the one mentioned above is the most outstanding.

¹⁰ It was in 1688 that WILLIAM BENTINCK, first earl of Portland, came over from Holland with Prince WILLIAM III of Orange Nassau, Stadtholder of Holland, who was to ascend the English throne as King WILLIAM III in the spring of 1689.

¹¹ JONAS DRYANDER (1748-1810), born in Sweden, was a pupil of LINNAEUS. Later on he came to settle in London where he succeeded SOLANDER as librarian to BANKS in 1782. He also became librarian of the Linnean Society. See also this Journal, Vol V, October, 1939, p. 154.

¹² LINNAEUS *fil.* was travelling abroad during the years 1781 and 1782. He first went to England; his ship sailed from Gothenburg on April 27, 1781. He stayed in London for 18 months and left for a visit to Paris at the end of August, 1782. From there he passed through the Netherlands (where he met the younger BURMAN), visited Hamburg and Copenhagen, and ultimately returned to Uppsala at the end of 1782.

been the case with many of the Orchis tribe [Orchidaceae], for want of our knowledge of their requisite treatment; while many of the *Liliacei* [!] have flowered on their arrival, but though their bulbs have continued to exist, they have seemed rather to languish than to flourish, for want of their native arid soil and burning sun. Such deficiencies and disappointments indeed were scarcely felt while Mr. Masson continued at the Cape, so abundant and repeated were his supplies. The Dutch appear not to have restrained his inquiries and acquisitions. He was allowed to travel many hundreds of miles up the country, and we have often heard him recount his adventures. At length, his harvest having been judged, for the present, sufficiently abundant, he was, in 1776, ordered to explore the Canary Islands, the Azores, Madeira, and part of the West Indies, especially the island of St. Christopher. In this mission he employed about five years more, and returned to England in 1781.

During his stay at the Cape, he entered into correspondence with the great LINNÆUS. Having discovered a bulbous plant of a new genus, he was not only laudably ambitious of botanical commemoration in its name, but he was particularly anxious, as appears by one of his letters, to receive this honour from no less a hand than that of his illustrious and venerable correspondent. This indeed was the "*unicum premium*", the only reward to which he aspired for all his labours. That he sought no pecuniary advancement, the extreme slenderness of the stipend which could be obtained for him, and his disregard of such objects at all times, abundantly evinced. He obtained the honour to which he aspired. The specimen of *Massonia* in the herbarium of LINNÆUS, named by his own trembling hand near the close of his life, proves that the name had his sanction, though it appears from the *Supplementum Plantarum*, p. 27,¹³ to have been originally suggested by THUNBERG, in whose company MASSON botanized for two years at the Cape. This justice rendered to the merits of our botanical traveller, was finally crowned by the publication of plates of two species of *Massonia*, in the *Hortus Kewensis* of his friend AITON, a book which he had so eminently contributed to enrich, by his discoveries in various parts of the world. Before that book appeared however in 1789, he had, in 1783, visited Portugal and Madeira, and had returned to the Cape of Good Hope in 1786. He now combined experience and foresight with zeal and activity. He was prepared to take advantage of different seasons—in some to collect specimens, in others roots and seeds—so as best to make up for former deficiencies or losses; and he had already made himself acquainted with the various situations, or tracts of country, most promising for every purpose. In consequence of this knowledge, it was settled, in consultation with his able adviser, sir

¹³ LINNÆUS fil., *Supplementum Plantarum Systematis Vegetabilium*, etc. (1781).

JOSEPH BANKS, that his travels should now be restrained to within forty miles of the Cape town. That space of country was found to be as yet unexhausted, and almost perhaps inexhaustible, as to what it might afford for our gardens, and the expense as well as labour of the undertaking was, by this plan, greatly lessened.

Mr. MASSON returned to England again in 1795, and spent two years there among his botanical friends, seeing the produce of his exertions every day blooming around him, at Kew and at Hammersmith, his residence at Kensington placing him within reach of the principal botanic gardens, as well as at a moderate distance from the great theatre of scientific and literary information in Soho Square.¹⁴

A life of so much leisure soon became irksome to a man who had been used to so much bodily exertion, and mental recreation, amid the wild and novel scenes of nature, and he solicited another mission. This was obtained from his royal master, at the recommendation of his former friend and patron [Sir JOHN PRINGLE¹⁵]; and he was sent to explore such parts of North America, under the British Government, as appeared most likely to produce new and valuable plants. This was truly a national project, worthy of those who planned it; the vegetable productions of that country, from the hardiness of their constitution, being not merely objects of curiosity, taste or luxury, but capable of being naturalized among us, for the probable benefit of our arts, our domestic and rural economy, our kitchen gardens and farms, as well as of our shrubberies and parterres. The success of our traveller was equal to the expectations that had been formed. New plants, of interesting characters and properties, sprang up under his steps, and it seemed probable that much practical knowledge was likely to result from his discoveries, even through the experience and converse of the wild inhabitants of those little explored regions. So others have found who have followed Mr. MASSON; for he survived not to reap or to communicate more than a foretaste of these advantages. He died about Christmas, 1805, in the sixty-fifth year of his age, at Montreal, in Canada. What little property he left, fell into the hands of two of his nephews, and consisted chiefly of the journals of his various travels, drawings, and collections of dried plants and other natural productions. Some of these relics have been purchased by the present Mr. LEE,¹⁶ of Hammersmith, a worthy friend of their original possessor.

¹⁴ Sir JAMES SMITH refers here to BANKS's house in Soho Square, the gathering-place of science.

¹⁵ For Sir JOHN PRINGLE see Part II of this paper: the short address preceding MASSON's *Account of three Journeys . . . into the Southern Parts of Africa*, with footnote 37 giving some biographical data, and also the BANKS Memorandum.

¹⁶ JAMES LEE the younger, MASSON's friend at Hammersmith, a nurseryman like his father, was a less known personality than the latter. The elder JAMES LEE (1715-1795), who entered in partnership with LEWIS KENNEDY as nurserymen at

From him, or from our own personal knowledge, most of the above particulars are derived; the dates only being taken from the short mention of our deceased friend, communicated by the present Mr. AITON to SIMS and KONIG's¹⁷ *Annals of Botany*, v. 2, 592".

So far Sir JAMES, who concludes his article with a quotation from a letter he received from the younger LEE (see below), and a few notes about MASSON's work *Stapeliae Novae*, to which we will return later.

With reference to the preceding, it should be added that the Royal Garden at Kew where MASSON obtained employment, in those days was not a government institution as it is to-day, but a private royal domain, "the pleasure garden of 'Farmer George' and his wife Charlotte", as MACOWAN puts it.¹⁸

The author seems to be uncertain as to the year MASSON was sent to the Cape for the first time. This definitely was in 1772.

Sir JAMES EDWARD SMITH's article in *Rees's Cyclopaedia* is followed by the description of the genus *Massonia* and of 8 species known at the time, viz.: (1) *M. latifolia*, L. f., Broad-leaved M.; (2) *M. muricata*, Ker, Prickly-leaved M.; (3) *M. scabra*, Andr. (= *M. pustulata*, Jacq.), Shagreen-leaved M.; (4) *M. echinata*, L. f., Rough-leaved M.; (5) *M. pauciflora*, Ait., Few-flowered M.; (6) *M. angustifolia*, L. f. (= *Polyxena angustifolia*, Baker), Narrow-upright-leaved M.; (7) *M. undulata*, Willd. ex Kunth (= *P. marginata*, Baker), Waved-leaved M.; and (8) *M. ensifolia*, Ker (= *P. pygmaea*, Kunth), Trumpet-flowered M. Although there is no indication as to the authorship of these descriptions, we may well attribute them to SMITH.

We now come to a number of letters in the SMITH Correspondence, written by and about MASSON and including the two letters referred to and quoted from by Sir JAMES.

the Vineyard, Hammersmith, in 1760, was a correspondent of LINNAEUS. He translated part of LINNAEUS's works into English, under the title of "Introduction to the Science of Botany". This was the first description of the sexual system of plants to appear in the English language. Moreover he was instrumental in introducing many exotic plants into cultivation in England, inter alia the *Fuchsia*. After his death—his partner having predeceased him—his son continued the nursery business. MASSON has also known the elder LEE.

¹⁷ JOHN SIMS (1749–1831), botanist and physician, edited CURTIS's *Botanical Magazine* from 1801–1826 (vols. xiv–xlii) and from 1805–1807, in conjunction with KONIG, the *Annals of Botany*.

CHARLES DIETRICH EBERHARD KONIG (orig. KÖNIG) (1774–1851) was a German mineralogist, who came to England to arrange the collections of Queen CHARLOTTE at the end of 1800. Later he became assistant to DRYANDER, librarian to BANKS. In 1807 he succeeded Dr. SHAW as assistant keeper of the department of natural history in the British Museum.

¹⁸ MACOWAN, *Personalia of Botan. Collectors at the Cape*, re-published by VERDUYN DEN BOER in *Botanists at the Cape I*, p. 40 (1929).

FRANCIS MASSON TO LINNAEUS AND LINNAEUS FILIUS¹⁹

FIRST LETTER TO LINNAEUS

London, Dec. 26, 1775.

Honourable Sir,

I hope your goodness will excuse the liberty I have taken in addressing myself to you, as it proceeds from a knowledge of your superior merit, and your exalted character in natural history. I have been employed some years past, by the King of Great Britain, in collecting of plants for the Royal Gardens at Kew. My researches have been chiefly at the Cape of Good Hope, where I had the fortune to meet with the ingenious Dr. Thunberg, with whom I made two successful journeys into the interior parts of the country. My labours have been crowned with success, having added upwards of 400 new species to his Majesty's collection of living plants, and I believe many new genera.

I expect soon to go out on another expedition, to another part of the globe, to collect plants for his Majesty. If I should be so fortunate as to discover any thing new in any branch of natural history, I should be happy in having the honour of communicating it to you. I had the pleasure of seeing Mr. Sparrmann at the Cape, and received from him a parcel of seeds, which he collected in the Southern Islands, and which I now send to you. I could not presume to send you any Cape plants, as I suppose Dr. Thunberg has sent you every kind that he collected, which are much the same as mine. I also intended sending you a collection of the St. Helena plants; but that I shall defer until your ports are open for shipping.

The inclosed specimen I think is a new genus, to which my worthy friend Mr. Thunberg had a great desire of giving the name of *Massonia*, honouring me with this mark of his friendship. But notwithstanding the good will of Dr. Thunberg and many other botanical friends, I have declined receiving that honour from any other authority than the great Linnaeus, whom I look upon as the father of botany and natural history, in hopes that you will give it your sanction. I am sorry that the leaves are not more perfect; but it is the only specimen I have [Pl. XXXVII]. I shall take the liberty to give a description of the root and leaves; the flowers being perfect, I refer them to your better judgment.

Radix bulbosa, tunicata, subglobosa, diametro sesquiunciali.

Folia duo, radicalia, ovata, subrotunda, acuminata, glabra, laevia, carnosa, nervosa, nervis immersis, palmaria, adspersa maculis numerosis purpurascens.

¹⁹ Selected pages—*Smith—Linnaeus's Correspondence*, Vol. II, 1821, pp. 559–565. These letters do not show any spelling-mistakes, they must have been corrected before they were printed.

Scapus brevissimus, sinubus foliorum quasi immersus, teres, glaber. Habitat in campis elevatis in regione Roggeveld.²⁰

I have seen another species with narrow leaves, which flowered in Kew garden. This I shall send you by next opportunity. I shall add no more, but am, with great esteem, your most obedient, humble servant,

Francis Masson

SECOND LETTER TO LINNAEUS

Madeira, Aug. 6, 1776.

Honourable Sir,

I had the pleasure of receiving yours on the 19th of May, on which day I left England. This prevented my writing you an answer; nevertheless, I left orders with Mr. Lee [the elder] to send you a specimen of the *Massonia angustifolia*, with an engraving of both species; also several other dry plants, which I thought were new genera. I am glad of the intelligence concerning the *Massonia*. I was so weak a botanist as to think its fruit, being a capsule, would entirely separate it from the genus *Haemanthus*; but I beg leave to offer an argument in favour of my former opinion; which is, that the aforesaid plant has *germen superum*, whereas *Haemanthus* has *germen inferum*.²¹ Your good nature and generosity, in acquiescing to confer the honour of a genus on so young a botanist as I am, deserve my most grateful thanks.

I have observed many new plants here, especially trees, which I think are new genera, but have not seen their fructification perfect. I have noticed that most of the Syngenesious plants²² are of the first subdivision, *Corollis ligulatis*,²³ which to me are a little difficult, having found several shrubby plants which I can refer to no genus but *Sonchus* [Comp.], which is very uncommon. I have observed that all the rare plants grow either on the high cliffs near the sea, or in horrible deep chasms, that run towards the middle of the island. But towards the top, which is more than 5000 geometrical feet perpendicular, I have found nothing but a few European plants, especially *Spartium scoparium*.²⁴ I have taken the freedom to send you a few plants, which I should be glad to know your opinion of, there being many which I could not determine.

²⁰ Root bulbous, tunicated, subglobose, one and a half inches in diam.; leaves two, radical, ovate, roundish, narrowed near the top into a little point, glabrous, thin, fleshy, nervose, with immersed nerves, the size of a hand, strewn with numerous purplish dots; stem very short, as if sunk in the folds of the leaves, terete, glabrous. Habitat: in high veld in the Roggeveld region.

²¹ *Germen superum* and *germen inferum*: ovary superior and ovary inferior.

²² With stamens having the anthers united, but filaments free.

²³ *Corollae ligulatae*: strap-shaped corollae, as in the ray-flowers of Compositae.

²⁴ *Spartium scoparium*, L. (Leguminosae), now known under the name *Cytisus scoparius*, Link, is the common or Scotch broom, widely spread over Europe.

I have sent you a plant under the name of *Aitonia rupestris*²⁵ of Forster's *Genera Plantarum*, which he discovered at Madeira, and named it in honour of William Aiton, his Majesty's botanical gardener at Kew. But if the said gentleman deserved that honour, I think Forster did him great injustice, to give an ingenious gardener a plant which can never be introduced into Europe, and consequently its existence will still be doubted. I know Mr. Aiton has no ambition for that honour; but still, for the respect I have for so ingenious a gardener, I took the liberty to give No. 19* that name, thinking it a new genus, and a plant which will soon be introduced into the European gardens; but this matter I must submit to your better judgment. I shall now conclude with imploring the Divine Being to grant you still a longer existence on earth, to patronize the great study of the works of Nature; which is the earnest wish of, Sir, your most obliged, humble servant, Francis Masson.

* This was no other than *Campanula aurea*. Linn. Suppl. 141.—Note by SMITH who refers to LINNAEUS *fil.*, Suppl. *Plantarum*, 1781.

LETTER TO LINNAEUS FILIUS

Sir,

Madeira, Dec. 12, 1778.

In June last I was honoured with your long-desired epistle, dated December 1777. Being at that time in the Canaries, I had no opportunity of acknowledging the favour; but now being again arrived in the island of Madeira, I have taken the earliest opportunity of acknowledging how much I am indebted to you for your civility.

I condole with you on the death of your great father; a loss which every lover of arts and sciences must ever feel.

I am sorry that the small parcel of specimens which I sent was damaged in the passage; but am happy to know a better way of conveyance than by London. The hurry and confusion, peculiar to great cities, will account for the difficulty of obtaining such objects. I humbly thank you for the names of those that were perfect, but cannot help offering my opinion concerning the *Echium (candicans)* and *Digitalis (Sceptrum)*.²⁶ The first is a very large shrub, having spikes of blue flowers near two feet long

²⁵ This Madeira plant has nothing to do with the Cape genus of that name, *Aitonia*, Thunb., with *A. capensis*, Thunb. as sole species, originally classified with the Sapindaceae. Later it was re-named *Nymania capensis*, (Thunb.) Lindb. and classified with the Meliaceae. The species owes its common names "Chinese Lanterns" and "Klapperbos" to its curious bladdery capsules of a bright rosy colour.

In the Linnean Society's custody there is a Latin diagnosis of "*Aitonia rupestris*", covering 2 pp. 4to, taken from FORSTER's *Genera Plantarum*, in MASSON's handwriting and signed "F. Masson". In a note regarding this little document it is stated to be an enclosure to MASSON's letter of August 6, 1776 to LINNAEUS, but this is in contradiction with a little note of MASSON's following the diagnosis and which reads: "N.B. Send this description along with the Plant. adieu, F. Masson." FORSTER's plant is characterized by lanceolate, bi-serrate leaves and flowers in a panicle.

²⁶ *Echium candicans*, L. (Boraginaceae), from Madeira, and *Digitalis Sceptrum*, L. = *Isoplexis sceptrum*, Steud. (Scrophulariaceae), a native of the Canaries.

at the extremities of the branches, which make a glorious experience when in bloom. I think the *Echium argenteum*,²⁷ from the Cape of Good Hope, is far from being so fine a plant. I think also the *Digitalis* differs from the *canariense*, in size of the shrub, mode of flowering, and figure of the corolla. I am sorry it is not in my power to renew the specimens of those which were lost, having sent all the Madeira collection to England. But as the Canary collection still remains in my possession, I have sent a few seeds and specimens, which I hope you will receive in better order.

Respecting the Physicians and Botanists in Portugal, I have not the honour of being acquainted with any of them. But since my residence here I have contracted a correspondence with Mr. De Visme, a merchant in Lisbon, who has a fine botanic garden, and is an enthusiastic lover of plants. By his last letter he informed me that the Queen of Portugal had sent several young botanists (students of Vandelli²⁸) to their settlements of Angola and Brazil to explore these rich countries. But I have a poor opinion of the genius of the Portuguese for such researches. I have now finished my peregrinations among the Fortunate Islands,²⁹ and have found great pleasure, as well in the novelty of their productions as the singularity of the country. Madeira consists of tremendous broken precipices, covered with the most luxuriant evergreens. The woods are shady and moist, abounding with the most curious species of *Filices* and *Musci*. The Azores are remarkable for abundance of hot springs and other vestiges of volcanos; but their natural productions come nearer to those of Europe. The Canaries, remarkable for the enormous height of the land, abound with rare plants, which nearly approach the productions of Africa. I have made no collections of animals in these islands. The birds are but few, and those well known in Europe. Of insects and shells I have seen none worthy of observation. I now wait for a passage to the West Indies; but the present war, in which my country is involved,³⁰ will, I fear, render my voyage less extensive than I at first expected. I shall always esteem your correspondence the greatest honour, and cheerfully contribute my mite for the advancement of natural knowledge.

²⁷ *Echium argenteum*, Berg., later re-named *Lobostemon argenteus*, (Berg.) Buek., found by THUNBERG at the Cape.

²⁸ DOMENICO (Port. DOMINGOS) VANDELLI, born in Padua in 1735, and died in Lisbon in 1816, came to settle in Portugal in 1764. He became a professor of natural history and chemistry at the University of Coimbra, and is the founder of the botanical garden of this university. He published various botanical works, inter alia on the Portugal and the Brazil flora.

²⁹ By the Fortunate Islands MASSON designates the Canaries and Madeira, and, as may be gathered from his letter, also the Azores. The name "Fortunate Islands" (Isles of the Blest, the abode of the extremely happy) was originally applied by the Greeks to mythical islands in the Western Atlantic. When the Canary Islands were discovered, the name was attached to them.

³⁰ In 1778 England was at war with France and Spain.

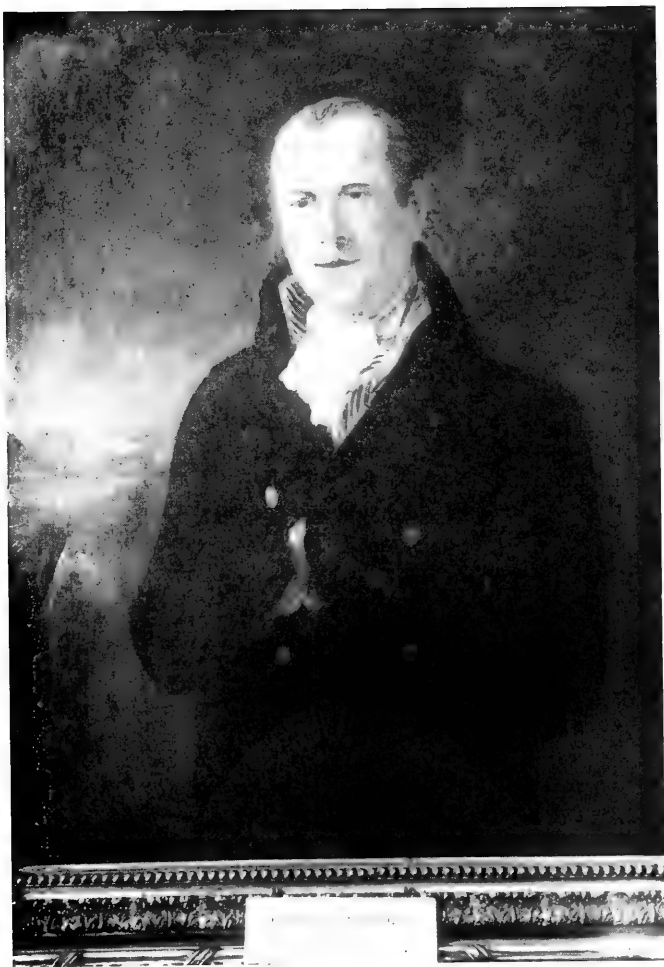


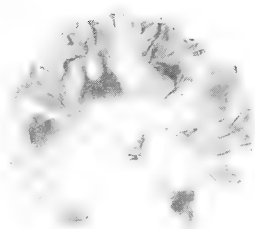
PLATE XXXVI.
FRANCIS MASSON

After an oil-painting at the Linnean Society of London.

214. 2.



Massonia latifolia



4. 2.



Labelle

Massonia

PLATE XXXVII.

The "Massoniae" in the Herbarium of LINNAEUS. *Massonia latifolia*, L. f. and, in the top corner, *Polygona angustifolia*, Baker (syn. *M. angustifolia*, L. f.).

The Linnean Society of London.

I long to hear the fate of Mr. Thunberg, with whom I had the honour to be acquainted at the Cape, we having together made two long journeys into the interior parts of that country, *in which time I profited much by his extensive knowledge in the history of Nature.*³¹ Inclosed is a list of the specimens, with some local observations. I have the honour to be, with all possible respect, your most obedient, humble servant,

Francis Masson.

The Linnean Society's collection of manuscripts includes a list of plants and seeds from the Canaries (and Madeira) under the title "Plantae Canarienses", in MASSON's handwriting, sent to Uppsala, which beyond doubt is the enclosure referred to in the above letter to the younger LINNAEUS. Several of those plants were published in *Supplementum Plantarum* (1781), with MASSON quoted as the collector. LINNAEUS *filius* has corrected and added the binominals. The list covers two 4to sheets, each showing the name "Carl von Linné", written at the bottom in MASSON's handwriting. The list numbers 61 plants and seeds; under the listed seeds we found one Cape plant, viz., "51. *Massonia latifolia* ex C. B. S."

There are only two specimens—on separate sheets—under the name *Massonia* in the herbarium of LINNAEUS, viz., *M. latifolia* and *M. angustifolia*. On the *latifolia* sheet the genus name has been written by the elder LINNAEUS, while LINNAEUS *fil.* has added the name of the species. It is interesting to notice on the latter sheet that LINN. *fil.* started to write a different specific name, but crossed it out before having finished it.

The photographs of the two specimens, for which we are indebted to the Linnean Society, had to be joined into one illustration (see Plate XXXVII), the utter smallness of the one specimen rendering a separate reproduction less feasible.

There is not the slightest doubt about it that the specimen of *M. latifolia* is the very same plant MASSON sent to LINNAEUS, enclosed with his letter of Dec. 26, 1775. MASSON apologizes in his letter for the imperfection of the leaves: the specimen in the herbarium shows damaged leaves. And then there is the reference to the *M.* specimen in the herbarium of LINNAEUS in SMITH's biography of MASSON in *Rees's Cyclopaedia*, which speaks for itself. The short Latin description MASSON gives of this plant (probably made up by one of his London friends) in his letter to LINNAEUS, matches the description of *M. latifolia*, L. f. in *Rees's Cycl.* and also in the *Flora Capensis*.

M. latifolia, the species on which the gen. *Massonia* was founded (Thunb. ex Linn. fil. Suppl. pp. 27 et 193), was discovered by THUNBERG

³¹ The italics are ours.

(possibly also by MASSON who was THUNBERG's companion on that journey) in the Roggeveld region of the central Cape in 1774, and introduced into cultivation at Kew by MASSON in 1775. The species of *Massonia*, an endemic Cape genus belonging to the Liliaceae, are characterized by fragrant hyacinthoid flowers, arising in a sessile or subsessile globose head from between two broad prostrate leaves. In most of the species the perianth is whitish like in the type species *M. latifolia*. The inflorescence is surrounded by a whorl of bracts (involucre). The number of species known is now 45: they are mainly found in the central district, but are also recorded from Namaqualand to the Uitenhage and Albany districts. This is a genus of attractive little plants. They may not be showy like so many others of the Liliaceae family, but they definitely belong to the more precious gems of our wonderful Cape flora.

It is a pity that the *latifolia* specimen in the herbarium of LINNAEUS is rather poor. The right-hand leaf, less damaged than the other one, is just over 4 inches broad; the leaf being incomplete, the length cannot be measured. The ovate leaves of this species can grow 6—10 inches long. Both the outer and inner bracts of the involucre are shown.

Now we come to the tiny specimen in the top corner of the illustration. Originally named *M. angustifolia* by the younger LINNAEUS (*Suppl.* p. 193), the species was later separated from the gen. *Massonia* and included in the gen. *Polyxena*, Kunth,³² as *P. angustifolia* by BAKER. This genus differs from *Massonia*, inter alia by the inflorescence being a loose corymb, the bracts not arranged in an involucre, and the erect, usually narrow leaves. The perianth is white in most species, but there are also with lilac or mauve flowers like the type species *P. pygmaea*, Kunth (*Massonia ensifolia*, Ker: *Polyanthes pygmaea*, Jacq.). Also this genus is endemic in the Cape. It now comprises 10 species, mainly found in the central district, but also in Namaqualand and in the Worcester, Uniondale and Uitenhage districts. *P. angustifolia*, Baker, has white flowers which are very fragrant. It was found by THUNBERG on the summit of a mountain, in the Onderste Roggeveld (Lower —), in 1774, and introduced into cultivation by MASSON in the following year. We may safely assume that the specimen in LINNAEUS's herbarium is the same as the one referred to in MASSON's letters to LINNAEUS of Dec. 27, 1775, and Aug. 6, 1776. Engravings of this species (under the name *M. angustifolia*) and of *M. latifolia* were published in ARTON's *Hortus Kewensis*, i. p. 405, tab. 4 (1789): cf. SMITH in his article in *Rees's Cyclopaedia*.

The herbarium specimen of *Polyxena angustifolia* (photographed on a somewhat larger scale than the other plant) shows the inflorescence

³² C. S. KUNTH, *Enumeratio Plantarum*, etc., vol. 4, p. 294 (1843).

complete with bracts between the rests of the two leaves. However, there is enough left of the leaves to show that they are erect and narrow. In the description of this small liliaceous plant in the *Flora Capensis*, the leaves are stated to be 6 inches long and $1-1\frac{1}{2}$ inches broad above the middle; the shape is described as oblong-spathulate.

THE YOUNGER JAMES LEE TO JAMES EDWARD SMITH³³

There are two letters (autographs), written at Hammersmith. The first and shorter one, of March 11, 1806, written also on behalf of LEE's business associate ("for Self & Co"), may be quoted here as far as it deals with MASSON. After a bit of information (obviously asked for), *inter alia* that they cannot procure any Fuchsia seed, the writer gives ample expression of their esteem for SMITH's abilities as a scientist. Then, turning to MASSON, LEE writes: "We are sorry to have to communicate to you the death of our dear Friend Masson who died at Montreal in Jan^y last,³⁴ we lament his fate most sincerely, he was hard dealt by, in being exposed to the bitter cold of Canada in the decline of life, after twenty five years Services in the Hot Climates, and all for a pittance—he has done much for Botany and Science, and deserves to have some lasting memorial given of his extreme modesty, good temper, generosity, and usefulness. We hope when opportunity serves you will be his Champion."

The second letter which is nearly entirely devoted to MASSON and which is the one SMITH has quoted from in his article, may be reproduced here in full.

Hammersmith, 9 July 1812.

Dr Sir

I received y. kind letter of the 12th May with a packet of seeds from Russia for which accept our best thanks—I have also received Ys. of the 22 June concerning the particulars of the life of Mr. Masson—I mentioned to you that I thought he had been ill used, and ill paid, considering what he had done for his Majesty's Gardens, and for the Science of Botany in general—he explored the Cape of Good Hope twice, Madeira, the Canaries, Azores, Spain, Gibraltar, Tangier, Minorca, Majorca, the West Indies, and Canada—I thought I could have procured the particulars of his life from his Nephews, who inherited his property, but it proves to be only the journals of his various travels thro the above countries, the reason of my delay in answering yours is the continued

³³ Selected folios.—*Scientific Correspondence of Sir J. E. Smith*. Vol. 6, K-L.

³⁴ Most authors give 1805 (late in December, abt. Christmas) as the year of his death.

number of people who are night and day here to see our Collection of Roses, which are now in flower, walking round and round from six in the morning till ten at night, leaves us quite exhausted, but that should not have prevented me so much as my papers were all packed up as our house is painting, I have Searched in Vain, as I cannot find any document of Masson's life or any memorandum concerning him—One of his Nephews who had his journals is dead, after spending all the money he divided with the other Nephew, I waited therefore some time till I could get the journals (as I thought his life) which were somewhere on account of distress. I have bought Masson's Canada Specimens of him as I had his others—Masson was of a mild temper, persevering in his pursuits even to a great enthusiasm, of great industry which his Specimens, and drawings of Fish, Animals, Insects, plants, and Views of the Countries he passed thro evince, and tho he passed a solitary life in distant Countries from Society his love of natural history never forsook him, characters like him seem for the present dwindling in the world, but I trust they will revive— —I cannot add more as I have several people waiting and I could add nothing to what I have said by delay. I therefore trust you will forgive me for the delay in answering y. letter—

I am D^r Sir with great respect

Y. much obliged Ser^t

James Lee

P.S. I cannot recollect the particulars of what Konig and Sims have said, and I have not the Annals of Botany by me. If a work would sell of Memoranda Massoniana there is matter enough to carry it to great extent.

Addressed to: J. E. Smith

Norwich

PORTRAIT OF FRANCIS MASSON. The three-quarter length portrait reproduced herewith (Plate XXXVI), which hangs on the wall of the main staircase in Burlington House, the seat of the Linnean Society of London, is, according to BRITTEN,³⁵ undoubtedly the very same that was at one time in the possession of JAMES LEE: it was bought from a general dealer at Hounslow in 1884 by Mr. W. CARRUTHERS, who presented it to the Linnean Society. MASSON is shown with a background of cliff: on the left is a view of Table Bay viewed from the north; Devil's Peak, Table Mountain, and Signal Hill are readily distinguishable. The artist is unknown.

(To be continued)

³⁵ J. BRITTEN, *Some Early Cape Botan. and Coll.*, in Journ. Linn. Soc.—Botany, Vol. xlv (1920–22), p. 43.

BOOK REVIEW

SPECIES PLANTARUM. Carl Linnaeus. A facsimile of the first edition of 1753. With an introduction by W. T. Stearn. Vol. I. London. Ray Society, 1957. 50s.

The first edition of the *Species Plantarum* has been chosen by international agreement as the starting point of botanical nomenclature. As the book itself is a rare one and as earlier facsimiles have been long out of print, this publication is one of great importance. The present work is, however, much more than a facsimile of the original text. In an introduction of 173 pages, there is contained a great wealth of information about Linnaeus himself, his works, and about the origins and sources of the *Species Plantarum*. The introduction is, indeed, a remarkable example of really clear condensation of a very large mass of information in small compass.

In the more general portion of the introduction there is a short account of the life of Linnaeus, a bibliography of his botanical works including a section on the *Amoenitates Academiae* with a list of the dissertation and their authors, and sections on Linnaeus' system of classification and on the *Hortus Cliffortianus*. In the part more closely connected with the *Species Plantarum*, there are sections on the introduction of binomial nomenclature and some of the contemporary reactions to it, and on the sources used by Linnaeus, together with a list of references to those quoted in abbreviated form.

There are useful chapters on the typification of Linnaean genera and species with some notes on the difficulties that can arise. There is also an account of the Linnaean herbaria and of the material known to have been used by Linnaeus. In this part there is conveyed a warning to workers that the collection housed at the Linnaean Society in London cannot be regarded as at all necessarily typifying the *Species Plantarum* nor in all cases expressing its author's views.

There are useful glossaries of the geographical terms used in the original work and of abbreviations and symbols. There are also notes on the various editions of the *Species Plantarum*. Included here are facsimiles of the cancelled pages of the first edition which are of historical interest even if of no nomenclatorial importance. There is a bibliography to each section in the introduction and a full index.

The text reproduced in this volume covers the first 500 pages. A second volume completing the work is promised in the very near future. There is an index to the part reproduced which includes references to the 5th edition of *Genera Plantarum* (1754).

The printing throughout is excellent, that of the facsimile part sharp and easily read. The volume opens easily at any place. There is a coloured frontispiece of the Wedgewood medallion portrait of Linnaeus and several reproductions of woodcuts from Linnaeus' works.

The volume is one that no botanical library can at all afford to be without and with its wealth of information should have an appeal to botanists in general. In any case all must feel under a debt of gratitude to the Ray Society for making it available at so very reasonable a price.

R. S. ADAMSON.

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